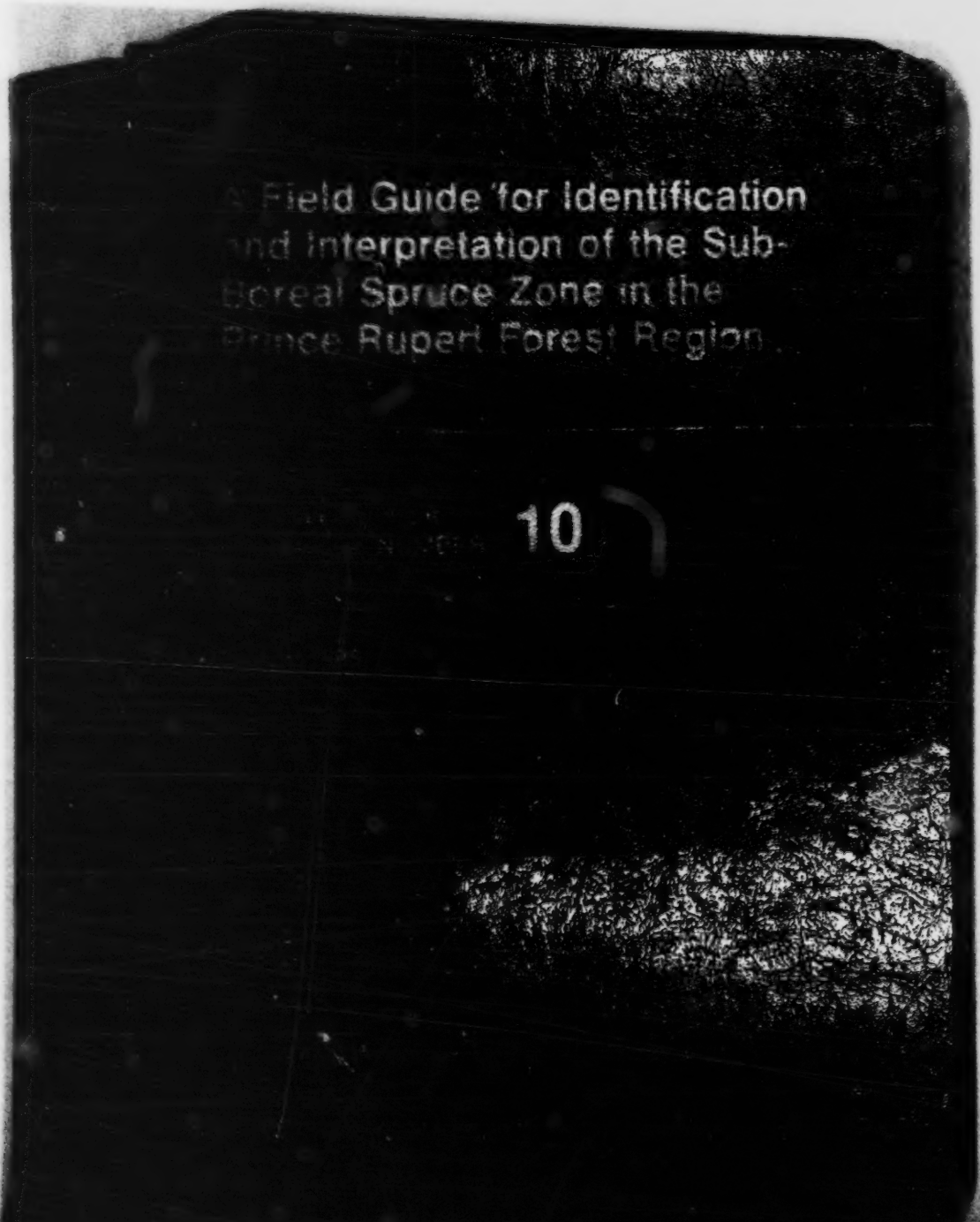
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63 & 64	reverse edatopic grids
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40(3rd paragraph)	replace 2.3 mm. with 1.2 mm.
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A Field Guide for Identification and Interpretation of the Sub-Boreal Spruce Zone in the Prince Rupert Forest Region

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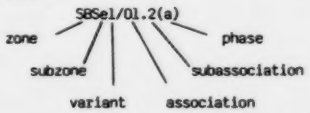
1 INTRODUCTION

Within the Sub-Boreal Spruce Zone (SBS) of the Prince Rupert Forest Region, the forest manager encounters a considerable range of stand types, forest productivities, and stand responses to various kinds of treatment. Such variability arises not only from different stand histories but also from intrinsic differences in the climate, topography, geology, and soils of various forest sites or ecosystems. This field guide aims to provide a practical, efficient tool to identify these intrinsically different ecosystem units in the field. This will allow forest management knowledge and experience to be organized, communicated, and used more effectively, and permit more confident extrapolation of knowledge from better-known to lesser-known situations or locales.

It is assumed that the user of this guide has completed the training programmes of the regional ecology and pedology staff so that the basic concepts and methods of site, soil, and vegetation evaluation have been mastered. Consequently the field guide does not include material on plant identification, on hand texturing, or on humus forms. To identify questionable or unknown plants, consult "Some Common Plants of the Sub-Boreal Spruce Zone" (Pojar et al. 1982). Refer to Land Management Report Number 17, "Ecosystem Classification and Interpretation of the Sub-Boreal Spruce Zone, Prince Rupert Forest Region, British Columbia" (Pojar et al. 1984) for further information on principles and philosophy; on methods underpinning the classification; on the physiography, geology, terrain, and climate of the SBS; or for more detailed information on the classification and management interpretations of the ecosystems of the SBS subzones. See also Coates and Haeussler (1984) for a guide to mechanical site preparation.

2 USE OF THE GUIDE

The Ministry of Forests classification of ecosystems is arranged into a hierarchy that may be thought of as having two primary levels -- biogeoclimatic and ecosystematic. Biogeoclimatic categories include the zone, subzone, and variant; ecosystematic categories include the association, subassociation, and phase. A standard code is used to denote these categories; an example follows:



In addition, connotative common names are generally applied to the various categories, for example the "lithic phase of the Pine - lichen - moss association."

Using the guide involves two main steps: first, identifying the biogeoclimatic subzone or variant; second, identifying the ecosystem association or subassociation, and phase where defined.

2.1 Identifying Subzones and Variants

Section 3 of this guide presents information required to determine the biogeoclimatic subzone or variant, including a map, one table summarizing key habitat features, and a second table presenting diagnostic floristic elements of the various SBS subzones and neighbouring subzones of the ESSF, ICH, and CWH. Larger scale maps are available for reference. Maps at a scale of 1:500 000 form part of the Supplement to Land Management Report Number 17; 1:250 000 maps are on file in the Prince Rupert Forest Region office in Smithers.

To determine the subzone, the user should first verify it on a map of appropriate scale, by checking with the habitat and floristic features of Tables 1 and 2. If the area in question is near a subzone boundary and doubt still remains after the verification step using Tables 1 and 2, then efforts should be made to identify the ecosystem for both feasible subzones. The descriptions and interpretations for both ecosystems should then be compared and the most appropriate information applied.

2.2 Identifying Ecosystem Units

Sections 4, 5, and 6 present information for the SBSa2, SBSd, and SBSel, respectively, of the Prince Rupert Forest Region. These sections include information needed to identify the various ecosystem associations, subassociations, and phases of the three SBS subzones; as well as information on recommended, ecosystem-specific, silvicultural practices for each of these units.

The following steps are suggested to identify the ecosystem unit:

Step 1

Consult a biogeoclimatic map and Tables 1 and 2 to determine the subzone in which the site occurs.

Step 2

Walk the area in question and note the site and soil factors needed to assess moisture and nutrient regimes. Watch for pronounced differences in topography, wetness, or vegetation that would indicate that more than one ecosystem may be present. For each relatively similar area determine moisture and nutrient regime to place the site on the edatopic grid. Consider such factors as landscape position, slope, and aspect; soil texture and coarse fragments; humus form and thickness; depth to water table or mottling; soil depth and rooting depth. Note the ecosystem indicated for this part of the edatopic grid.

(Steps 3 through 6 apply to each relatively uniform area identified in Step 2:)

Step 3

Note the plant species and their abundance.

Step 4

Use the information of Steps 1, 2, and 3 to work through the ecosystem key for the subzone. Proceed to the indicated ecosystem association. If this association encompasses the moisture and nutrient regimes indicated by Step 2, proceed to Step 5; if not, recheck your observations and attempt to obtain agreement. Reference to Figures 5, 9, or 13, which depict the relative prominence of species in the various ecosystems, may be helpful at this point.

Step 5

Compare the site and its soil and vegetation with that summarized for the indicated ecosystem association (or subassociation, and phase if defined). If there is reasonable fit, proceed to Step 6; if not, record all pertinent data and discuss with regional ecology staff.

Step 6

Consider the management interpretations suggested for the ecosystem. These are located on the pages facing the ecosystem descriptions. Modify as necessary to suit site-specific and stand-specific conditions.

Note that because of the lack of development in the Prince Rupert portion of the SBSa2, the interpretations are very preliminary for that variant. They are based on extrapolation of experience from similar ecosystems in the SBSd and SBSel. However, the more severe climate of the SBSa2 may well result in as yet unforeseen changes to management regimes applied elsewhere in the Sub-Boreal Spruce Zone.

3 SUBZONES AND VARIANTS

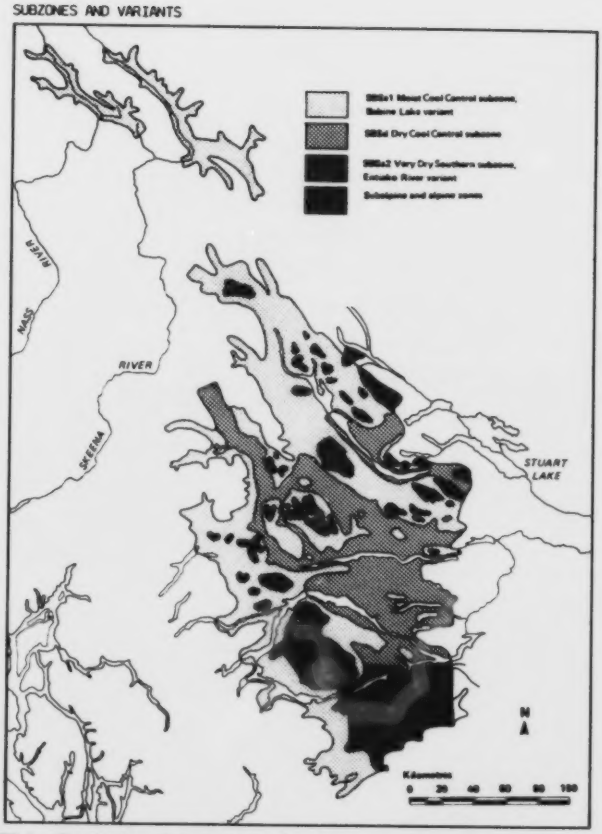


FIGURE 1. The Sub-Boreal Spruce Zone (SBS) and its subzones in the Prince Rupert Forest Region.

TABLE 1. Characteristics of the three Sub-Boreal Spruce subzones of the Prince Rupert Forest Region

Subzone	SBSa2	SBSd	SBSel
Geographic distribution	Entiako drainage; S of Ootsa-Natalkuz lakes, E of Tweedsmuir	Bulkley-Endako valleys; Lakes District	most of Nechako Plateau; Bulkley-Endako valleys and Lakes District above SBSd
Elevation range	900-1300m	500-750m in the N 700-1100m in the S	500-1050m in the N 850-1350m in the S
Major trees[1]	Pl and Sw	Sxw, Pl, and At	Bl, Sxw, and Pl
Understory features	sparse shrub and herb layers; moderate moss layer with many lichens on mesic sites	diverse shrubs and herbs, grasses common; absence or scarcity of: Vaccinium membranaceum, Oplopanax horridus, Ferns (Gymnocarpium, Athyrium, and Dryopteris), Streptopus roseus, and Tiarella trifoliata	poor to moderate shrub and herb layers; lush moss; common presence of:
Zonal plant association	Pl-Sw-Pleurozium schreberi	Pl-Sxw-(At)-Rosa acicularis-Lathyrus nevadensis-Pleurozium schreberi	Sxw-Bl-Cornus canadensis-Pleurozium schreberi-Ptilium crista-castrensis
Zonal Soil	Brunisolic Gray Luvisols; Dystric Brunisols	Brunisolic Gray Luvisols; Dystric Brunisols	Gray Luvisols; Dystric Brunisols; Humo-Ferric Podzols
Humus Form	Hemimors	Hemimors; Hormoders	Hemimors

[1] Tree species abbreviations as in Appendix 1.

TABLE 2. Distinguishing floristic features of the Sub-Boreal Spruce subzones and neighbouring biogeoclimatic units, in the Prince Rupert Forest Region

Species[1]	Biogeoclimatic unit[2]					
	SBSa2	SBSd	SBSel	ESSF	ICHg	CWHf
Conifers:						
Rocky Mtn. juniper	_[3]	*	-	-	+	-
Fd	-	+	-	-	-	-
Pl	****	****	****	**	***	**
Se	***	-	-	-	-	-
Sxw	*	****	***	**	*	-
Sb	**	*	*	-	+	-
Sxe and/or Sxs	-	-	-	-	**	**
Bl	+	+	****	****	***	+
Ba	-	-	-	-	*	***
Hw	-	-	-	*	+	+
Cw	-	-	-	-	***	***
Hw	-	-	+	*	****	****
Deciduous trees:						
At	*	****	***	+	***	*
Ep	-	**	*	-	***	*
Act	+	**	*	+	**	**
Dr	-	-	-	-	-	**
Shrubs:						
Amelanchier alnifolia	+	**	*	-	*	*
Rosa acicularis	***	****	***	*	***	*
Alnus incana	**	**	**	+	*	-
Vaccinium membranaceum	*	+	****	****	***	**
Oplopanax horridus	-	+	****	**	****	****
Phyllodoce empetriformis	-	-	-	***	-	-
Cassiope mertensiana	-	-	-	***	-	-
Corylus cornuta	-	-	-	-	**	+
Vaccinium ovalifolium	-	-	+	**	**	****
Vaccinium alaskaense	-	-	-	+	*	****
Rubus spectabilis	-	-	-	+	*	***
Rosa nutkana	-	-	-	-	**	***
Vaccinium parvifolium	-	-	-	-	+	***

TABLE 2. (Continued)

Species[1]	Biogeoclimatic unit[2]					
	SBSa2	SBSd	SBSel	ESSF	ICHg	CWHf
Herbs:						
Lathyrus nevadensis	+	****	*	-	**	*
Rubus pubescens	*	***	***	*	**	*
Aster conspicuus	+	***	**	+	**	-
Galium boreale	*	***	**	+	*	+
Rubus pedatus	*	+	****	***	***	****
Gymnocarpium dryopteris	+	+	****	**	****	****
Tiarella spp.	*	+	***	**	***	****
Senecio triangularis	-	-	+	***	+	+
Valeriana sitchensis	-	-	+	***	+	+
Veratrum viride	-	-	+	***	+	+
Artemisia arctica	-	-	-	***	-	-
Athyrium filix-femina	-	+	*	*	**	***
Lysichiton americanum	-	-	-	-	*	***
Mosses and Liverworts:						
Pleurozium schreberi	****	****	****	***	****	**
Ptilium crista-castrensis	**	***	****	**	****	*
Hylocomium splendens	*	**	**	*	****	****
Rhytidiadelphus triquetrus	+	**	+	+	**	*
Barbilophozia spp.	*	+	*	***	**	*
Rhytidiopsis robusta	-	-	+	*	*	***
Rhytidiadelphus loreus	-	-	-	+	*	****
Lichens:						
Peltigera spp.	***	**	**	**	*	*
Cladonia spp.	***	*	**	*	*	+
Cladina spp.	**	*	**	+	+	+

[1] See Appendix 2 for a list of both scientific and common names. Tree species abbreviations as in Appendix 1.

[2] Abbreviations of biogeoclimatic units: SBSa2, Entiako River variant of the Very Dry Southern Sub-Boreal Spruce subzone; SBSd, Dry Cool Central Sub-Boreal Spruce subzone; SBSel, Babine Lake variant of the Moist Cool Central Sub-Boreal Spruce subzone; ESSF, Engelmann Spruce - Subalpine Fir Zone; ICHg, Northwestern Transitional Interior Cedar - Hemlock subzone; CWHf, Northern Drier Maritime Coastal Western Hemlock subzone.

[3] Key:

****	dominant	*	uncommon
***	widespread	+	rare
**	common	-	absent

4 THE SBSa2 VARIANT

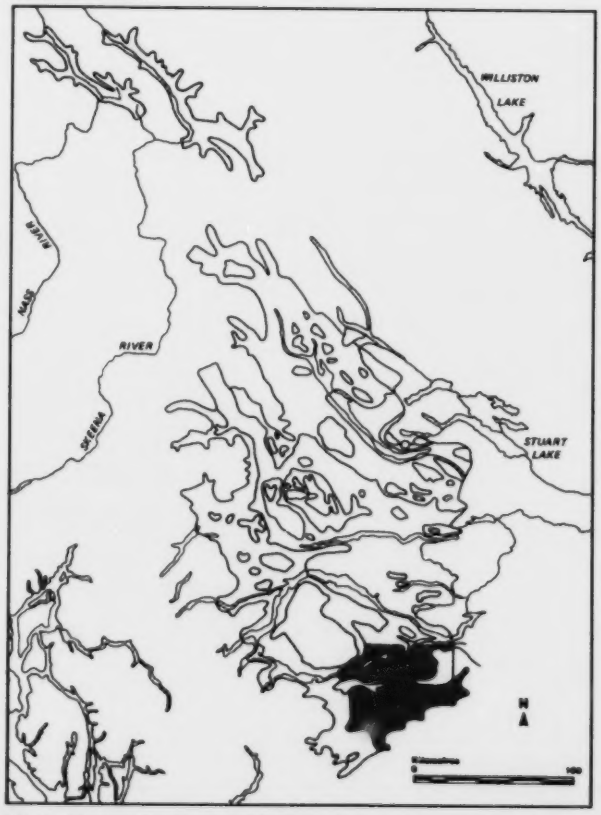


FIGURE 2. The Very Dry Southern Sub-Boreal Spruce subzone, Entiako River variant (SBSa2) in the Prince Rupert Forest Region.

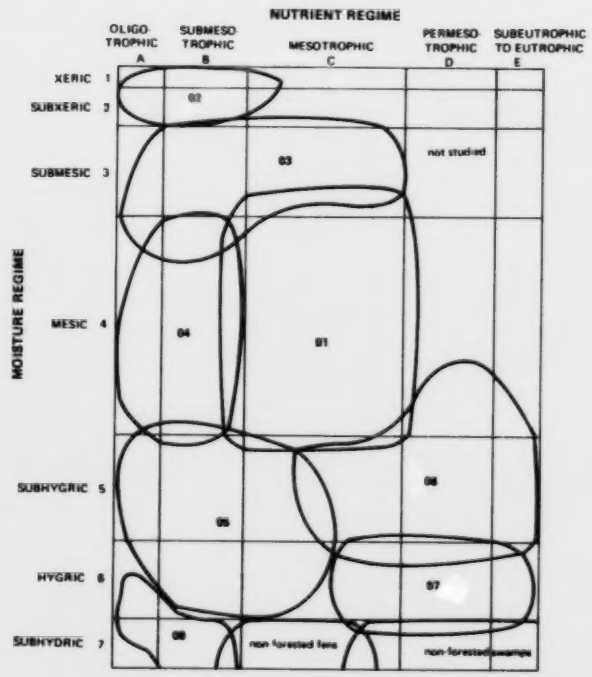


FIGURE 3. Edatopic grid of the SBSa2.

4.1 Key to Ecosystem Associations of the SBSa2

A One or more of Sb, Ledum groenlandicum, Empetrum nigrum, or Betula glandulosa present ..... B

AA Sb, Ledum, Empetrum, and Betula glandulosa all absent ..... D

B Tree layer of very poorly growing to stunted Sb. Shrub layer dominated by Ledum groenlandicum and Betula glandulosa; herb layer, by dwarf evergreens; moss layer, by Sphagnum spp. Wet organic soils

BLACK SPRUCE BOGS (SBSa2/08)

BB Tree layer of mixtures of Pl with either Sw and/or Sb; moss layer a carpet of feathermosses; mineral soils C

C Stands of Pl with a subcanopy of Sb and considerable cover of Ledum groenlandicum

PINE - BLACK SPRUCE - LABRADOR TEA (SBSa2/04)

CC Stands of poor Pl and Sw, although Sb may occur in understory tree and shrub layers; moss layer distinguished by presence of glow moss

MOIST POOR PINE - SPRUCE - GLOW MOSS (SBSa2/05)

D Stands of mainly Sw with better than average productivity; minor lichen cover ..... E

DD Stands of mainly Pl, some with Sw; average or lower productivity; lichens common ..... F

E Shrub layer moderately developed; moss layer includes leafy mosses (Mnium spp.); poorly drained mineral or organic soils

WET WHITE SPRUCE - MOUNTAIN ALDER - HORSETAIL - LEAFY MOSSES (SBSa2/07)

EE Shrub layer sparse; moss layer dominated by feathermosses; moderately good to imperfectly drained mineral soils

MOIST RICH WHITE SPRUCE - BLACK TWINBERRY - FEATHERMOSSES (SBSa2/06)

F Pl stands with very sparse shrub and herb layers and a moss layer dominated by lichens

PINE - LICHEN (SBSa2/02)

FF Pl - Sw stands with poorly developed shrub and herb layers; moss layers comprised of feathermosses and lichens ..... G

G Moss layer dominated by the three main feathermosses - Pleurozium, Ptilium, and Hylocomium; Cladonia lichens sparse

ZONAL PINE - WHITE SPRUCE - MOSS (SBSa2/01)

GG Ptilium and Hylocomium absent or sparse in moss layer; Cladonia lichens common

SUBMESIC PINE - LICHEN - MOSS (SBSa2/03)

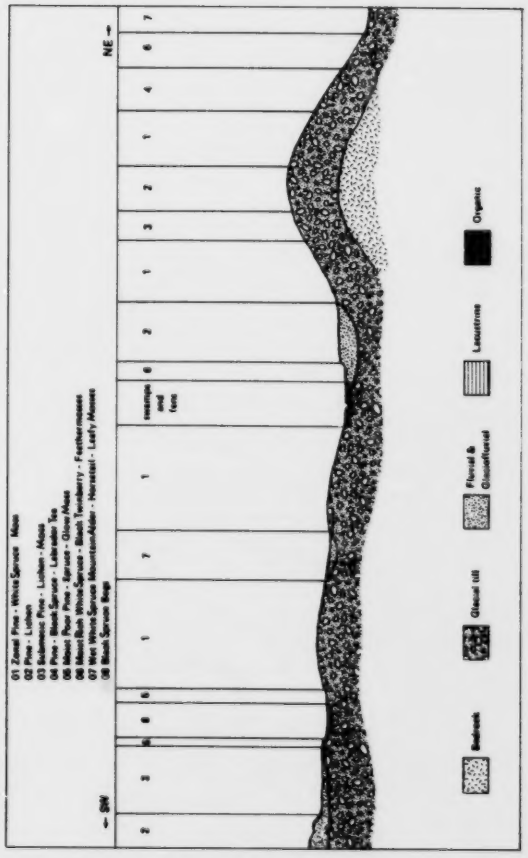

01 Zonal Pine - White Spruce - Moss
02 Pine - Lichen
03 Subxeric Pine - Lichen - Moss
04 Pine - Black Spruce - Labrador Tea
05 Moist Poor Pine - Spruce - Glow Moss
06 Moist Rich White Spruce - Black Trembling - Feathermosses
07 Wet White Spruce Mountain Alder - Horsetail - Leafy Mosses
08 Black Spruce Bog
~ SW
NE ~
Bedrock
Glacial till
Fluvial & Glaciofluvial
Lacustrine
Organic

FIGURE 4. Schematic sequence of ecosystems in the SBSa2 landscape.

4.2 Prominence of the Major Species of the SBSa2

Figure 5 depicts the relative prominence of several species that typify the SBSa2. Prominence is a measure derived from both presence and plant cover. For example, if a species was present on four of five plots (i.e., presence of 80%) and had a mean cover on the five plots of 7%, its prominence would be equal to:

(square root of 80)x(7) = 63 (rounded off to nearest whole number)

Figure 5 only includes species having a prominence value of 50 or more in one or more ecosystems. To get a firm idea of this cut-off value, note that a species that always occurs would have to have a cover of 5% or more. Clearly, this would not easily be overlooked in the field.

Figure 5 presents circles whose diameters are proportional to the prominence value. The diameter equivalent to a prominence value of 50 is about 2.3 mm.

4.3 Description and Intrepretation of SBSa2 Ecosystems

Following Figure 5 are two synoptic tables. Table 3 presents selected physical and edaphic features associated with the ecosystem units; Table 4 summarizes silvicultural interpretations for these units. The series of facing pages describe (left side) and interpret (right side) the various ecosystem units. The small figure that appears in the upper right of the descriptive page includes an edatopic grid with an outlined area indicating the usual moisture and nutrient conditions for the ecosystem in question. It also includes a small soil textural triangle with an outlined area(s) indicating the usual range of textures associated with the ecosystem. If two soil texture phases have been defined, they are indicated by white and black areas. The key to the white and black areas is located under the soils column adjacent to the phase subheadings. The black areas always apply to the coarser-textured phase.

Under the vegetation column, the figures that appear in square brackets, e.g. [45], indicate the average cover of the tree, shrub, herb, and moss layers.

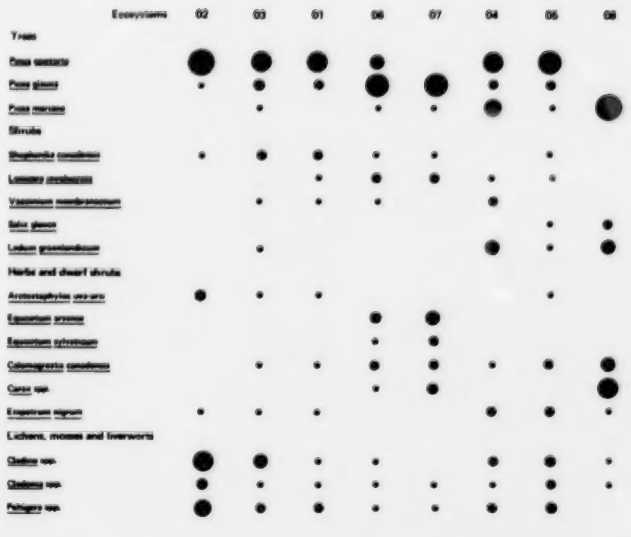


FIGURE 5. Prominence values for the major species of the SBSa2.

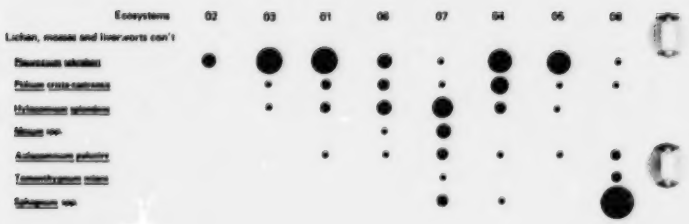


FIGURE 5. (Continued).

TABLE 3. Habitat features of the ecosystem units of the SBSa2

Ecosystem unit	Edatope	Slope range (%)	Aspect	Parent materials	Particle size class[1]	Drainage	Soil class[2]	Humus form class[2] and depth(cm)	Rooting depth (cm)
Pine - Lichen	1-2/A-C	0-3	flat	glaciofluvial; shallow residual; colluvial	sandy, sandy-skeletal	rapid	Dystric Brunisols	Mormoors 3	30
Subalpine Pine - Lichen - Moss	3/A-C	0-50	all	morainal; shallow glaciofluvial over morainal	loamy-skeletal, loamy, sandy-skeletal	good - rapid	Dystric Brunisols; Eluviated Dystric Luvisols	Mormoors; Humimors 6	35
Zonal Pine - White Spruce - Moss	4/C	2-55	all	morainal; shallow glaciofluvial over morainal	fine-loamy to sandy-skeletal	good - imperfect	Dystric Brunisols; Eluviated Dystric Luvisols	Humimors 8	35
Pine - Black Spruce - Labrador Tea	4/A-B	3-25	N, NW NE	morainal; glaciofluvial	coarse-loamy	good - imperfect	Dystric Brunisols; Eluviated Dystric Luvisols	Humimors 11	30
Moist Poor Pine - Spruce - Glow Moss	5-6/A-C	2-10	all	morainal	loamy	imperfect - poor	Eluviated Dystric Brunisols; Gleyed Eluviated Dystric Brunisols; Luvic Gleysols	Humimors 8	34
Moist Rich White Spruce - Black Twinberry - Feathermosses	5/C-E	0-15	all	fluvial; lacustrine	loamy, silty	mod. good	Orthic and Gleyed Orthic Gleysols; Dystric Brunisols; Regosols	Humimors; Hydromors 12	34
Wet White Spruce - Horsetail - Alder - Horsetail - Leafy Moses	6/C-E	0-10	all	morainal; organic; lacustrine	loamy, mesic, fibric	poor	Mesic Gleysols; Histosols and Fibrisols	Hydromoders; Histomors; Histosols 38	38
Black Spruce Bogs	6-7/A-B	0	level	organic	fibric	poor - very poor	Fibrisols and Mesisols	Histosols	30

1 Particle size classes and soil classes follow Canada Soil Survey Committee (1978).
2 Humus form classes after Klinka et al. (1981).

TABLE 4. Summary of silvicultural prescriptions and guidelines for the SBSa2

Ecosystem unit	Logging	Prescribed fire	Species selection[1] Pref.	Accept.	Unaccept.	Regeneration method	Brush[2] potential	Brushing and weeding
Pine - Lichen	AVOID	AVOID	Pl	-	Sw	natural or plant	very low	-
Subxeric Pine - Lichen - Moss	summer[3] (winter)	AVOID	Pl	-	Sw	natural or plant	very low	-
Zonal Pine - White Spruce - Moss	summer[3] (winter)	AVOID	Pl	Sw[4]	-	natural or plant	very low	-
Pine - Black Spruce - Labrador Tea	winter summer (dry spells)	OK	Pl	Sb[4]	Sw	natural or plant	very low	-
Moist Poor Pine - Spruce - Glow Moss	winter summer (dry spells)	OK	Pl	Sw	Sb	natural or plant	very low	-
Moist Rich White Spruce - Black Twinberry - Featherosses	winter summer (dry spells)	OK	Sw	Pl	-	plant	moderate	as required
Wet White Spruce - Mountain Alder - Horsetail - Leafy Mosses	winter	OK	Sw	Pl[4]	-	plant	moderate to high	as required
Black Spruce Bogs	AVOID	-	-	-	-	-	-	-

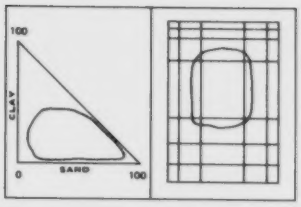
1 A preferred species for a managed forest is ecologically appropriate to the site and best suited to management objectives. An acceptable species is also ecologically appropriate, but less so than a preferred species, or is less suited to management objectives. An unacceptable species will not reach merchantable size in a reasonable time.
2 All deciduous trees, shrubs, and herbs that inhibit the establishment and growth of selected conifers.
3 Summer logging if slash for natural regeneration.
4 As a minor component (less than 20% of total crop trees present) of the stand; natural regeneration only.

ZONAL PINE - WHITE SPRUCE - MOSS
(SBSa2/01)

SLOPE POSITIONS: Level; middle, upper and lower slopes.

SLOPE RANGE: 2-55%.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: [42]. Pl Sw SHRUB: poorly developed; low shrubs except tree regeneration [23]. Sw (Pl) Rosa acicularis Shepherdia canadensis (Spiraea betulifolia) (Juniperus communis) HERB: poorly developed [20]. Cornus canadensis Linnaea borealis Epilobium angustifolium Arnica cordifolia (Arctostaphylos uva-ursi) (Calamagrostis spp.) (Vaccinium caespitosum) MOSS: well developed; dominated by feathermosses but with a notable lichen component [77]. Pleurozium schreberi Ptilium crista-castrensis Peltigera spp. Cladina spp. (Hylocomium splendens) (Dicranum spp.)	DRAINAGE: Good to imperfect. TERRAIN/PARENT MATERIALS: Morainal blankets and veneers; shallow glaciofluvial over morainal deposits. SOIL NAME: Orthic and Eluviated Dystric Brunisols; Brunisolic Gray Luvisols. HUMUS FORM: Hemimors.

COMMENTS: The moss layer of this zonal association is dominated by Pleurozium schreberi, as is that of the Subxesic Pine - Lichen - Moss, but the Pine - White Spruce - Moss has a greater diversity of mosses. It also has less lichen cover; Cladonia lichens are sparse to absent.

ZONAL PINE - WHITE SPRUCE - MOSS (SBSa2/01)

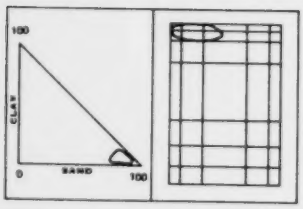
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- Sw.
Logging:	- summer and winter. - summer log when possible to provide disturbance for natural regeneration.
Site preparation:	
Mechanical	- OK. - preferable alternative to burning for reducing fire hazard.
Prescribed fire	- DO NOT BURN. - loss of organic matter will reduce site productivity.
Brush hazard:	- not expected.
Reforestation:	- plant Pl if required. - for natural Pl establishment, need adequate cones, viable seed, adequate mineral soil exposure, and suitable climatic conditions.

PINE - LICHEN (SBSa2/02)

SLOPE POSITIONS: Level; upper slopes to crests.

SLOPE RANGE: 0-3% (our samples).

ASPECT: Not applicable.



VEGETATION LAYERS	SOILS
TREE: open stands of poorly growing trees [12]. P1	DRAINAGE: Rapid.
SHRUB: mainly pine regeneration [40]. P1 (*Juniperus communis*)	TERRAIN/PARENT MATERIALS: Glaciofluvial materials - outwash, kames and eskers; colluvial veneers.
HERB: sparse [19]. *Arctostaphylos uva-ursi*	SOIL NAME: Orthic Dystric Brunisols.
MOSS: very well developed; dominated by lichens [95]. *Cladina* spp. *Cladonia* spp. *Peltigera* spp. *Pleurozium schreberi*	HUMUS FORM: Xeromors.

COMMENTS: The dominance of lichens rather than mosses in the "moss layer" clearly distinguishes the Pine - Lichen ecosystem association from both Subxeric Pine - Lichen - Moss and Zonal Pine - White Spruce - Moss associations.

PINE - LICHEN (SBSa2/02)

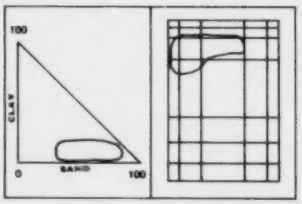
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Unacceptable	- Sw.
Logging:	- probably should be AVOIDED - summer and winter. - summer log when possible to provide disturbance for natural regeneration.
Site preparation:	
Mechanical	- OK. - screefing may be sufficient because of the thin humus layers.
Prescribed fire	- DO NOT BURN. - loss of organic matter will reduce site productivity.
Brush hazard:	- not expected.
Reforestation:	- natural regeneration of Pl preferred. - plant Pl if required.
Other comments:	- these ecosystems are marginal for timber production but may provide important winter habitat for woodland caribou.

SUBMESIC PINE - LICHEN - MOSS
(SBSa2/03)

SLOPE POSITIONS: Level; middle to upper slopes.

SLOPE RANGE: 0-65%.

ASPECT: Variable, usually not north to east.



VEGETATION LAYERS	SOILS
TREE: stands fairly open; poor growth [37]. Pl Sw	DRAINAGE: Good to rapid.
SHRUB: poorly developed; low shrub except tree regeneration [35]. Pl Sw Shepherdia canadensis Rosa acicularis (Spiraea betulifolia)	TERRAIN/PARENT MATERIALS: Morainal blankets; shallow glaciofluvial over morainal deposits.
HERB: sparse [17]. Cornus canadensis Linnaea borealis (Arctostaphylos uva-ursi)	SOIL NAME: Orthic and Eluviated Dystric Brunisols; Brunisolic Gray Luvisols.
MOSS: well developed; diverse [81]. Pleurozium schreberi Cladina spp. Cladonia spp. Peltigera spp. (Dicranum spp.)	HUMUS FORM: Xeromors; Hemimors.

COMMENTS: In contrast to the Pine - Lichen association, the Submesic Pine - Lichen - Moss has an abundance of both moss and lichens on the forest floor. The absence or very sparse cover of Ptilium crista-castrensis and Hylocomium splendens helps distinguish it from the Zonal Pine - White Spruce - Moss association.

SUBMESIC PINE - LICHEN - MOSS (SBSaz/03)

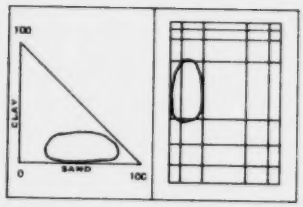
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Unacceptable	- Sw.
Logging:	- summer and winter. - summer log when possible to provide disturbance for natural regeneration.
Site preparation:	
Mechanical	- OK. - screefing may be sufficient because of the thin humus layers.
Prescribed fire	- DO NOT BURN. - loss of organic matter will reduce site productivity.
Brush hazard:	- not expected.
Reforestation:	- natural regeneration of Pl preferred. - plant Pl if required.
Other comments:	- these ecosystems are marginal for timber production.

PINE - BLACK SPRUCE - LABRADOR TEA
(SBSa2/04)

SLOPE POSITIONS: Middle to upper slopes.

SLOPE RANGE: 5-25%.

ASPECT: Usually northerly.



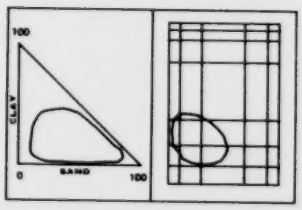
VEGETATION LAYERS	SOILS
TREE: trees small; stands densely stocked [36]. Pl Sb	DRAINAGE: Good to imperfect.
SHRUB: moderately developed; all low shrubs except tree regeneration [35]. Sb Ledum groenlandicum Vaccinium membranaceum Lonicera involucrata	TERRAIN/PARENT MATERIALS: Morainal blankets; glaciofluvial deposits.
HERB: sparse [17]. Empetrum nigrum Petasites palmatus Cornus canadensis Linnaea borealis (Gaultheria hispidula) (Lycopodium annotinum)	SOIL NAME: Eluviated Dystric Brunisols; Brunisolic Gray Luvisols.
MOSS: thick carpet of feather-mosses [81]. Pleurozium schreberi Ptilium crista-castrensis Hylocomium splendens Peltigera spp.	HUMUS FORM: Hemimors. OTHER FEATURES: Low soil temperatures during the growing season.

COMMENTS: A main canopy of pine with a secondary canopy of black spruce is the norm. Note the presence of Labrador tea on reasonably drained sites.

PINE - BLACK SPRUCE - LABRADOR TEA (SBSa2/04)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- Sb as a minor component.
Logging:	- winter. - dry periods in summer.
Site preparation:	
Mechanical	- OK.
Prescribed fire	- OK. - will reduce thick organic matter accumulations in older stands and probably improve soil temperatures.
Brush hazard:	- not expected.
Reforestation:	- natural regeneration of Pl preferred. - plant Pl if required.

MOIST POOR PINE - SPRUCE - GLOW MOSS (SBSa2/05)



SLOPE POSITIONS: Lower and toe slopes.

SLOPE RANGE: 2-10%.

ASPECT: All.

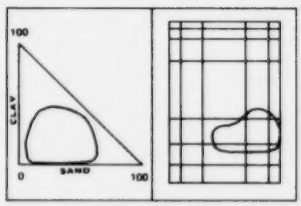
VEGETATION LAYERS	SOILS
TREE: trees have relatively poor growth [42]. Pl Sw (Sb)	DRAINAGE: Imperfect to moderately poor.
SHRUB: poorly developed; all low shrubs except tree regeneration [27]. Sw (Pl) (Sb) Betula glandulosa (Rosa acicularis) (Ledum groenlandicum) (Lonicera involucrata) (Salix spp.)	TERRAIN/PARENT MATERIALS: Morainal blankets. SOIL NAME: Gleyed Brunisolic Gray Luvisols; Gleyed Dystric Brunisols; Luvic Gleysols.
HERB: sparse but relatively diverse [18]. Calamagrostis canadensis Linnaea borealis Cornus canadensis Empetrum nigrum	HUMUS FORM: Hemimors. OTHER FEATURES: Rooting depth (mean of 34 cm) often restricted by high water tables and/or compact soil.
MOSS: well-developed feather-moss carpet with considerable lichen [73]. Pleurozium schreberi Aulacomnium palustre Peltigera spp. Cladina spp.	

COMMENTS: This ecosystem association is fairly abundant in the SBSa2, occurring most commonly as an imperfectly drained band around the numerous wetlands that dot the undulating till plain of the variant. The SBSa2/05 is the analogue of the SBSel/10, but is more frequent and widespread.

MOIST POOR PINE - SPRUCE - GLOW MOSS (SBSa2/05)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- Sw.
Unacceptable	- Sb.
Logging:	- winter. - summer during dry periods.
Site preparation:	
Mechanical	- OK. - preferable during summer dry periods to avoid soil compaction.
Prescribed fire	- OK.
Brush hazard:	- not expected.
Reforestation:	- plant Pl. - expect some natural regeneration of Sw.

MOIST RICH WHITE SPRUCE - BLACK TWINBERRY - FEATHERMOSSES (SBSa2/06)



SLOPE POSITIONS: Level or middle to lower slopes.

SLOPE RANGE: 0-15%.

ASPECT: Not applicable.

VEGETATION LAYERS	SOILS
TREE: mature trees large but widely spaced [53]. Sw (Pl)	DRAINAGE: Moderately good to imperfect.
SHRUB: poorly developed; mainly low shrubs except tree regeneration [25]. Sw Lonicera involucrata Rosa acicularis Viburnum edule (Alnus incana)	TERRAIN/PARENT MATERIALS: Mainly fluvial levels and aprons; some lacustrine deposits. SOIL NAME: Orthic and Gleyed Regosols; Orthic and Gleyed Melanic, Sombric, and Dystric Brunisols.
HERB: moderately developed and quite diverse [37]. Calamagrostis canadensis Cornus canadensis Equisetum arvense Linnaea borealis Epilobium angustifolium Fragaria virginiana Mitella nuda (Petasites palmatus)	HUMUS FORM: Hemimors; Moders. OTHER FEATURES: Ah horizons often present.
MOSS: well developed [64]. Pleurozium schreberi Ptilium crista-castrensis Hylocomium splendens Peltigera spp. (Tomenthypnum nitens)	

COMMENTS: A common ecosystem association in the SBSa2, but quite localized, usually on fluvial landforms along major streams.

MOIST RICH WHITE SPRUCE - BLACK TWINBERRY - FEATHERMOSSES
(SBSa2/06)

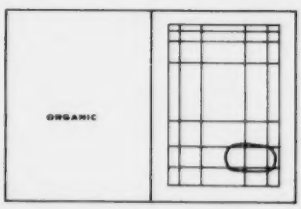
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sw.
Acceptable	- Pl.
Logging:	- winter. - summer during dry periods.
Site preparation:	
Mechanical	- OK. - may increase brush competition.
Prescribed fire	- OK. - if no Ah horizon, maintain F and H layers; if Ah present, fire impacts not so great a concern.
Brush hazard:	- moderate.
Reforestation:	- PLANT Sw PROMPTLY to compete with brush species.

WET WHITE SPRUCE - MOUNTAIN ALDER - HORSETAIL - LEAFY MOSSES (SBSa2/07)

SLOPE POSITIONS: Toe slopes; level and depressional.

SLOPE RANGE: 0-10%.

ASPECT: Not applicable.



VEGETATION LAYERS	SOILS
TREE: mature trees large; usually widely spaced [33]. Sw	DRAINAGE: Poor.
SHRUB: moderately developed [31]. Sw Lonicera involucrata Ribes lacustre Ribes hudsonianum (Alnus incana)	TERRAIN/PARENT MATERIALS: Morainal blankets with or without organic veneers; organic blankets; lacustrine veneers.
HERB: moderately well developed; quite diverse [57]. Equisetum arvense (Equisetum sylvaticum) Calamagrostis canadensis Carex spp. Mitella nuda Cornus canadensis Linnaea borealis (Rubus pubescens) (Petasites palmatus) (Gymnocarpium dryopteris)	SOIL NAME: Humic Gleysols; Mesisols and Fibrisols.
MOSS: well developed [74]. Hylocomium splendens Mnium spp. Aulacomnium palustre (Sphagnum spp.) (Brachythecium spp.)	HUMUS FORM: Hydromoders; Histomoders; Histomors.
	OTHER FEATURES: Note thick surface organic horizons and high water tables.

COMMENTS: A relatively uncommon ecosystem association, usually localized in small, poorly drained depressions or wet flat spots in the landscape. Some representatives of this association could be classified as swamps.

WET WHITE SPRUCE - MOUNTAIN ALDER - HORSETAIL - LEAFY MOSSES (SBSa2/07)

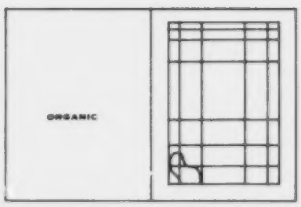
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sw.
Unacceptable	- Pl on better drained mineral soils only.
Logging:	- winter.
Site preparation:	
Mechanical	- OK. - often not feasible due to wetness.
Prescribed fire	- OK. - beneficial but difficult due to wetness throughout the year.
Brush hazard:	- moderate to high.
Reforestation:	- PLANT Sw PROMPTLY so that it has a chance to outcompete the brush species.

BLACK SPRUCE BOGS (SBSa2/08)

SLOPE POSITIONS: Level and depressional.

SLOPE RANGE: 0.

ASPECT: Not applicable.



VEGETATION LAYERS	SOILS
TREE: sparse to moderately developed; very poor growth [15]. Sb SHRUB: well developed [70]. Sb (stunted plus immature) Ledum groenlandicum Betula glandulosa HERB: moderately developed; mainly dwarf evergreens [48]. Empetrum nigrum Kalmia microphylla Vaccinium oxycoccos Carex aquatilis MOSS: very well developed [99]. Sphagnum spp. (Icmadophila ericetorum) (Cladina spp.) (Cladonia spp.)	DRAINAGE: Poor to very poor. TERRAIN/PARENT MATERIALS Organic blankets. SOIL NAME: Fibrisols, Mesisols, and Humisols. HUMUS FORM: Histomors. OTHER FEATURES: Fibric materials dominate the upper 40 cm of soil.

COMMENTS: Bogs are very low in available nutrients, resulting in a very distinctive vegetation of poorly growing or stunted black spruce with a ground cover of Labrador tea and peat mosses. THESE ECOSYSTEMS ARE NOT SUITABLE FOR TIMBER PRODUCTION.

WETLANDS

The SBSa2 landscape is characterized by a forest canopy frequently broken by a diverse assemblage of wetlands. Apart from spruce swamps and black spruce bogs, treeless wetlands include meadows, shrub-carrs, fens, swamps, marshes, and shallow open water. Roberts (1984) has identified and characterized 16 wetland ecosystem associations in the bulk of the SBSa, which occurs within the Cariboo Forest Region. For detailed information refer to her "Guide to Wetland Ecosystems of the Sub-Boreal Spruce "a" Subzone, Cariboo Forest Region."[1]

Brief definitions of the various wetland types follow:

SHALLOW OPEN WATER - a wetland comprised of permanent, shallow, standing water that lacks extensive emergent plant cover and usually supports various submerged and floating aquatic plants.

MARSHES - wetlands that are permanently or seasonally inundated and that support an extensive cover of emergent plants.

FENS - wetlands comprised of in situ accumulations of well to poorly decomposed non-sphagnic peats with relatively high pH; minerotrophic waters.

BOGS - wetlands comprised of in situ accumulations of poorly to moderately decomposed Sphagnum-derived peats that are strongly acidic and poor in mineral materials.

SWAMPS - tall shrub-dominated wetlands that are characterized by periodic flooding and nearly permanent subsurface water flow through various mineral and organic substrates, rich in minerals and nutrients.

SHRUB-CARRS - low shrub-dominated wetlands developed on mineral materials that are saturated early in the growing season but rarely or very rarely inundated.

MEADOWS - herbaceous, often graminoid, wetlands developed on mineral materials that are saturated early in the growing season but are rarely or very rarely inundated.

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1 Roberts, A. 1984. Guide to the wetland ecosystems of the Sub-Boreal Spruce "a" Subzone, Cariboo Forest Region, British Columbia. B.C. Min. For., Research Section, Williams Lake, B.C. Unpublished manuscript.

5 THE SBSd SUBZONE

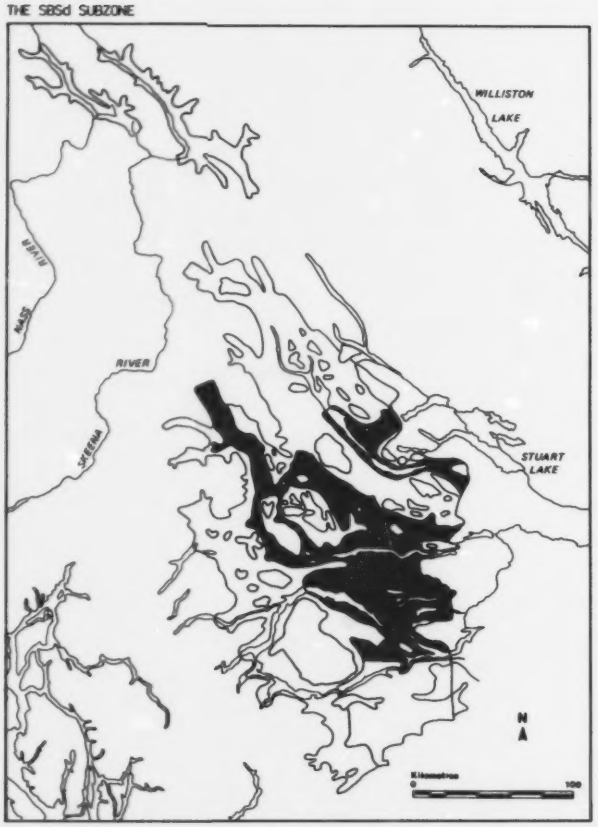


FIGURE 6. The Dry Cool Central Sub-Boreal Spruce subzone (SBSd) in the Prince Rupert Forest Region.

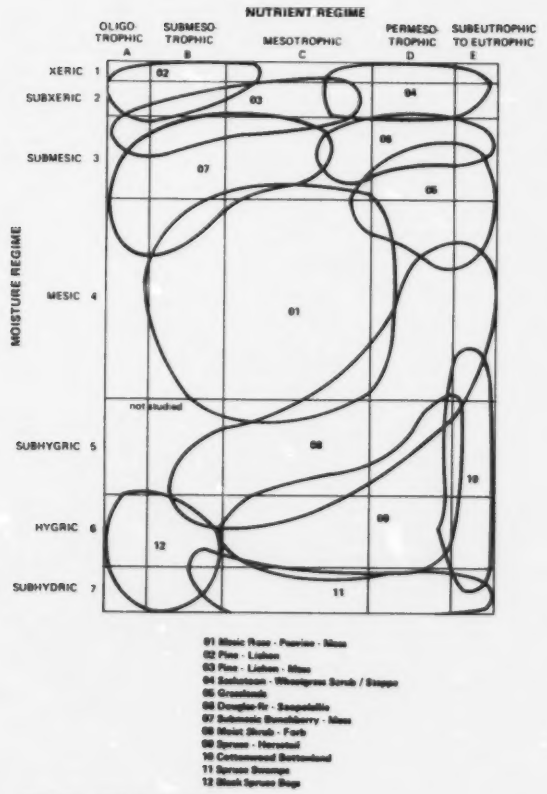


FIGURE 7. Edatopic grid of the SBSd.

5.1 Key to Ecosystem Associations of the SBSd

A Ecosystems with poor to very poor tree growth; soils either too dry or too wet ..... B

AA. Ecosystems with slightly below average to much better than average forest productivity ..... H

B Dry ecosystems on well to rapidly drained, coarse glaciofluvial materials, or on shallow soils over bedrock, or even on deep soils that have pronounced south to west aspects; tree layer absent or open C

BB Wet, poorly drained ecosystems; Sb common; organic soils predominate ..... G

C Tree layer absent ..... D

CC Tree layer present ..... E

D Shrub layer well developed

SASKATOON - WHEATGRASS SCRUB/STEPPE (SBSd/04)

DD Shrub layer lacking or nearly so; many grasses

GRASSLANDS (SBSd/05)

E Open Fd stands; *Shepherdia canadensis* common to abundant

DOUGLAS-FIR - SOOPOLALLIE (SBSd/06)

EE Pl-dominated stands; *Arctostaphylos uva-ursi* common to abundant ..... F

F Moss layer dominated by lichens

PINE - LICHEN (SBSd/02)

FF Moss layer has an abundance of both mosses and lichens

PINE - LICHEN - MOSS (SBSd/03)

G Shrub layer dominated by Betula glandulosa and Salix spp.; the herb layer, by Carex spp. and Equisetum spp. Frequent "rich" mosses such as Tomenthypnum nitens as well as Sphagnum spp.

SPRUCE SWAMPS (SBSd/11)

GG Shrub layer dominated by Ledum groenlandicum; the herb layer, by dwarf evergreen shrubs; the moss layer, by Sphagnum spp.

BLACK SPRUCE BOGS (SBSd/12)

H Act-dominated canopy

COTTONWOOD BOTTOMLAND (SBSd/10)

HH Coniferous or mixed canopy I

I Equisetum spp. abundant, Lonicera involucrata and Calamagrostis canadensis common to abundant

SPRUCE - HORSETAIL (SBSd/09)

II Equisetum spp. rare or lacking ..... J

J Very good mixed stands of Sxw, Pl, and (At or Ep), with well-developed, vigorous, diverse shrub and herb layers

MOIST SHRUB - FORB (SBSd/08)

JJ Average to below average stands; shrub layer only moderately to poorly developed ..... K

K Stands dominated by Fd

DOUGLAS-FIR - SOOPOLALLIE (SBSd/06)

KK Stands are a variable mixture of Sxw and Pl L

L Stands usually well stocked; herb layer well developed and vigorous; moss layer well developed but often obscured

MESIC ROSE - PEAVINE - MOSS (SBSd/01)

LL Stands may have an open canopy; herb layer moderately developed with poor to fair vigour; moss layer very well developed and clearly evident

SUBMESIC BUNCHBERRY - MOSS (SBSd/07)

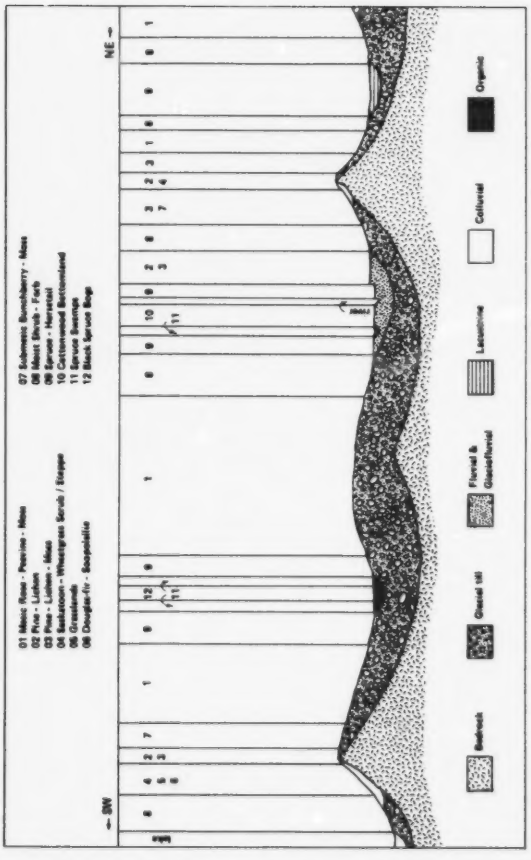


FIGURE 8. Schematic sequence of ecosystems in the SBSd landscape.

5.2 Prominence of the Major Species of the SBSd

Figure 9 depicts the relative prominence of several species that typify the SBSd. Prominence is a measure derived from both presence and plant cover. For example if a species was present on four of five plots (i.e., presence of 80%) and had a mean cover on the five plots of 7%, its prominence would be equal to:

(square root of 80)x(7) = 63 (rounded off to nearest whole number)

Figure 9 only includes species having a prominence value of 50 or more in one or more ecosystems. To get a firm idea of this cut-off value, note that a species that always occurs would have to have a cover of 5% or more. Clearly, this would not easily be overlooked in the field.

Figure 9 presents circles whose diameters are proportional to the prominence value. The diameter equivalent to a prominence value of 50 is about 2.3 mm.

5.3 Description and Interpretation of SBSd Ecosystems

Following Figure 9 are two synoptic tables. Table 5 presents selected physical and edaphic features associated with the ecosystem units; Table 6 summarizes silvicultural interpretations for these units. The series of facing pages describe (left side) and interpret (right side) the various ecosystem units. The small figure that appears in the upper right of the descriptive page includes an edatopic grid with an outlined area indicating the usual moisture and nutrient conditions for the ecosystem in question. It also includes a small soil textural triangle with an outlined area(s) indicating the usual range of textures associated with the ecosystem. If two soil texture phases have been defined, they are indicated by white and black areas. The key to the white and black areas is located under the soils column adjacent to the phase subheadings. The black areas always apply to the coarser textured phase.

Under the vegetation column, the figures that appear in square brackets, e.g. [45], indicate the average cover of the tree, shrub, herb, and moss layers.

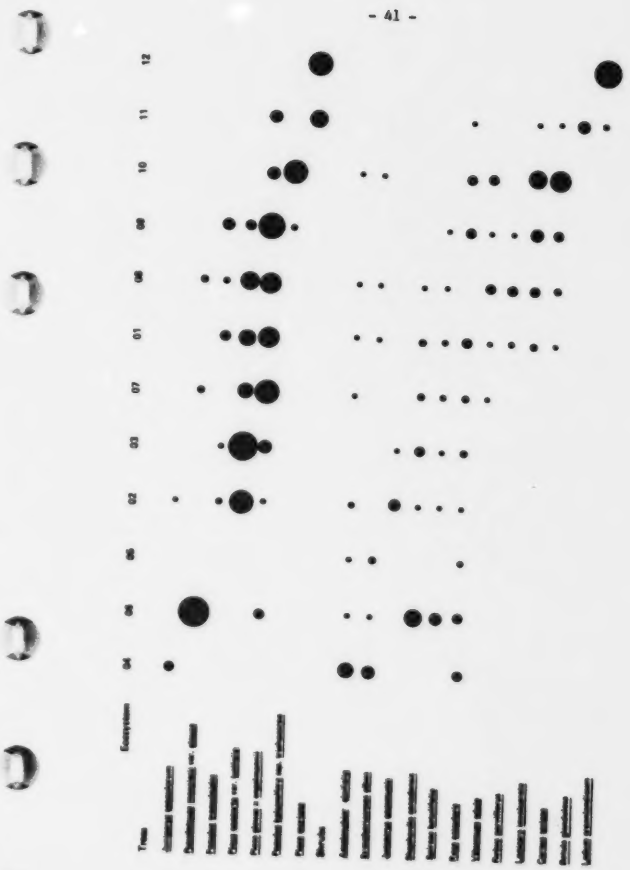


FIGURE 9. Prominence values for the major species of the SBDd.

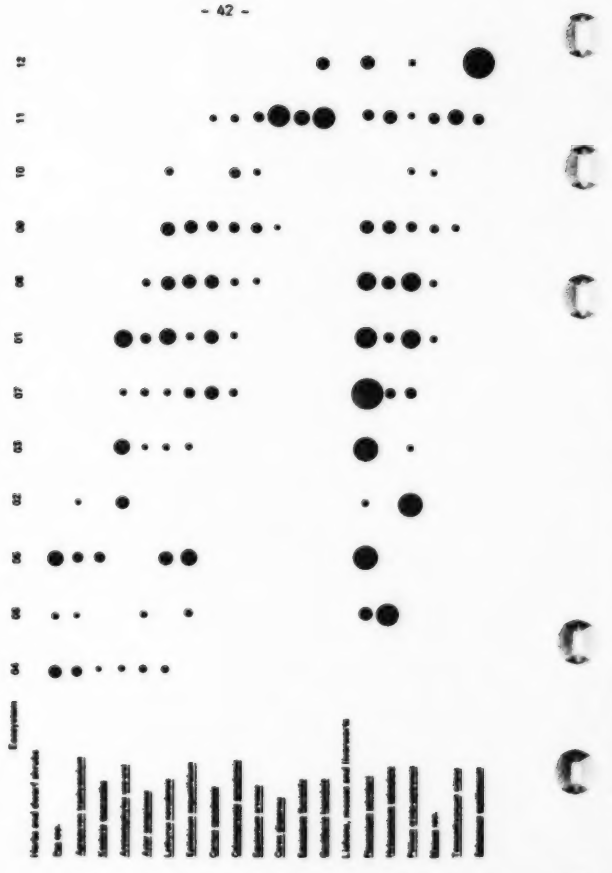


FIGURE 9. (Continued)

TABLE 5. Habitat features of the ecosystem units of the SBSd

Ecosystem unit	Edatope	Slope range (%)	Aspect	Parent materials	Particle size class[1]	Drainage	Soil class[1]	Humus form class[2] and depth(cm)	Rooting depth (cm)
Pine - Lichen	1-2/A-B	0-60	varies	colluvial	sandy	rapid	Eutric and Dystric Brunisols	Xeromors 1	51
Pine - Lichen - Moss	2/B-C	0-20	flat	fluvial; colluvial	coarse-loamy, sandy-skeletal	very rapid - rapid	Dystric Brunisols	Xeromors 2	27
Saskatoon - Wheatgrass Scrub/Steppe	1-2/D-E	23-60	S,SW	colluvial	loamy-skeletal	good	Melanic, Sombric and Eutric Brunisols	Rhizomulls 0.4	60
Grasslands	3-4/D-E	0-35	S,W	morainal; lacustrine	fine-loamy	mod. good	Dark Grey Luvisols; Melanic Brunisols	Rhizomulls 0.8	41
Douglas-fir - Soapolallie	3/C-E	0-65	varies	colluvial; morainal	coarse-loamy, loamy-skeletal	rapid - mod. good	Dystric and Eutric Brunisols; Grey Luvisols	Hemimors 6	27
Subxeric Bunchberry - Moss	3/B-C	0-40	all	glaciofluvial; morainal	fine-loamy, coarse-loamy, sandy	rapid - mod. good	Dystric Brunisols; Grey Luvisols	Hemimors 6	36
Mesic Rose - Peavine - Moss	4/B-C	1-30	all						
Coarse textured phase				morainal	coarse-loamy, sandy-skeletal	rapid - mod. good	Dystric Brunisols; Grey Luvisols	Hemimors; (Mormoders) 6	34
Fine textured phase				morainal	fine-clayey, fine-loamy	rapid - mod. good	Dystric Brunisols; Grey Luvisols	Hemimors; (Mormoders) 9	34
Moist Shrub - Forb	4-5/C-E	1-30	all	morainal	fine-loamy	good - mod. good	Grey Luvisols; Dystric and Eutric Brunisols	Hemimors; Mormoders 7	48
Spruce - Horsetail	5-6/C-D	0-7	flat						
Fluvial phase				fluvial	sandy-skeletal	good	Dystric Brunisols	Mormoders 11	41
Lacustrine phase				lacustrine	fine-clayey, fine-silty	poor	Humo and Humic Gleysols	Hydromors 9	33
Cottonwood Bottomland	5-6/D-E	0	flat	fluvial	coarse-loamy, sandy	rapid - good	Dystric Brunisols; Regosols	Hemors 4	60
Spruce Muskeg	7/C-E	0	flat	organic	fibric-mesic	poor - very poor	Mesisols and (Floristols)	Histomoders 5	16
Black Spruce Bogs	6-7/A-B	0	flat	organic	fibric-humic	poor - very poor	Fibrisols, Mesisols, and Humisols	Histomors 12	25

[1] Particle size classes and soil classes follow Canada Soil Survey Committee (1978).
[2] Humus form classes after Klinka et al. (1981).

TABLE 6. Summary of silvicultural prescriptions and guidelines for the SBSd

Ecosystem unit	Logging	Prescribed fire	Species selection[1] Pref.	Accept.	Unaccept.	Regeneration method	Brush[2] potential	Brushing and weeding
Pine - Lichen	summer[3], winter	AVOID	Pl	-	Sxw	natural or plant	very low	-
Pine - Lichen - Moss	summer[3], winter	AVOID	Pl	-	Sxw	natural or plant	very low	-
Saskatoon - Wheatgrass Scrub/Steppe	AVOID	-	-	-	-	-	-	-
Grasslands	AVOID	-	-	-	-	-	-	-
Douglas-fir - Soopolallie	summer[3], winter	AVOID	Fd, Pl	Sxw	-	natural or plant	very low	-
Subxeric Kinnikinnick - Moss	summer[3], winter	not recommended	Pl	Sxw[5]	-	natural or plant	very low	-
Mesic Moss - Feavine - Moss Coarse textured phase	summer[3], winter	OK[5]	Pl	Sxw	-	natural or plant	low	as required
Fine textured phase	winter, summer (dry spells)	OK[5]	Pl,Sxw	-	-	natural or plant	low	as required
Moist Shrub - Forb	winter, summer (dry spells)	OK	Pl,Sxw	-	-	plant	moderate-high	usually required
Spruce - Horsetail Fluvial phase	winter, summer	not recommended	Sxw	Pl	-	plant	moderate-high	REQUIRED
Lacustrine phase	winter	beneficial but difficult	Sxw	Pl	-	plant	high-extreme	REQUIRED
Cottonwood Bottomland	winter, summer (dry spells)	not recommended	Sxw	Pl	-	plant	high-extreme	REQUIRED
Spruce Muskeg	AVOID	-	-	-	-	-	-	-
Black Spruce Bogs	AVOID	-	-	-	-	-	-	-

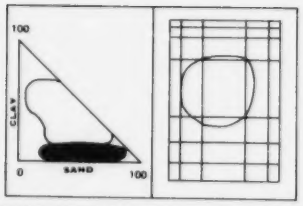
1 A preferred species for a managed forest is ecologically appropriate to the site and best suited to management objectives. An acceptable species is also ecologically appropriate, but less so than a preferred species, or is less suited to management objectives. An unacceptable species will not reach merchantable size in a reasonable time.
2 All deciduous trees, shrubs, and herbs that inhibit the establishment and growth of selected conifers.
3 Summer logging if siding for natural regeneration.
4 As a minor component (less than 30% of total crop trees present) of the stand; natural regeneration only.
5 If only the litter layer is removed, and if followed by planting.

MESIC ROSE - PEAVINE - MOSS (SBSd/01)

SLOPE POSITIONS: Middle (usually).

SLOPE RANGE: 0-30%.

ASPECT: All.



VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSd/01(a)	Fine textured phase SBSd/01(b)
TREE: stands usually well stocked [52]. Sxw Pl At	TEXTURE: Coarse-loamy, sandy-skeletal.	Fine-clayey, fine-loamy.
SHRUB: poorly to moderately developed, mostly low shrubs [30]. Sxw Rosa acicularis	DRAINAGE: Moderately good to rapid.	Good to imperfect.
	EFFECTIVE ROOTING: Deep (40-70 cm).	Clay enrichment of Bt horizon restricts rooting.
HERB: usually well developed and vigorous [53]. Lathyrus nevadensis Aster conspicuus Cornus canadensis Linnaea borealis Epilobium angustifolium Arnica cordifolia	COARSE FRAGMENT CONTENT: Sometimes greater than 35%.	Low.
	TERRAIN/PARENT MATERIALS: Glaciofluvial deposits; morainal blankets.	Morainal blankets.
MOSS: usually well developed [74]. Pleurozium schreberi Ptilium crista-castrensis Hylocomium splendens (Rhytidiadelphus triquetrus)	SOIL NAME: Orthic and Eluviated Dystric Brunisols; (Brunisolic Gray Luvisols).	Brunisolic (minor Orthic, Gleyed Brunisolic, and Dark) Gray Luvisols.
	HUMUS FORM: Hemimors; (Mormoders).	Hemimors; (Mormoders); (Leptomoders).

COMMENTS: Seral stages of the Mesic Rose - Peavine - Moss ecosystem association are widespread and typically dominated by trembling aspen or mixtures of aspen and lodgepole pine.

MESIC ROSE - PEAVINE - MOSS (SBSd/01)

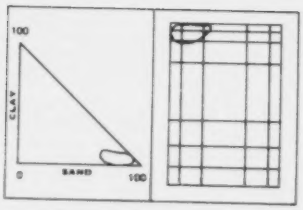
ACTIVITY OR CONCERN	Coarse textured phase SBSd/01(a)	Fine textured phase SBSd/01(b)
Species choice:		
Preferred	- Pl.	- Pl or Sxw.
Acceptable	- Sxw.	
Logging:	- winter or summer. - maximize disturbance for natural regeneration.	- winter and dry periods in summer. - cutblock boundaries should include areas with root-restricting, structureless, fine-textured or compact horizons near the surface (windfall potential).
Site preparation:		
Mechanical	- drag equipment OK for planter access or mineral soil exposure.	- if scraping or scalping, plant on mounds rather than in the depressions or gouges.
Prescribed fire	- OK for Pl establishment; not recommended for Sxw. - avoid if advanced regeneration is acceptable.	
Brush hazard:	- low unless disturbance is excessive.	- moderate.
Reforestation:	- if opting for naturals ensure there are adequate cones, viable seed, and adequate mineral soil exposure; plant if required.	
Other comments:	- frost-heaving is probable on exposed, non-insulated, silty soils. - use selection, shelterwood, or seedtree methods for regenerating Sxw naturally.	

PINE - LICHEN (SBSd/02)

SLOPE POSITIONS: Level or crest, usually located on or around exposed bedrock in the Prince Rupert Forest Region.

SLOPE RANGE: 0-60%.

ASPECT: Variable.



VEGETATION LAYERS	SOILS
TREE: open stands of poorly growing trees [25]. Pl	DRAINAGE: Rapid.
SHRUB: sparse except for pine regeneration [44]. Pl (Juniperus communis)	EFFECTIVE ROOTING: Variable.
HERB: sparse [35]. Arctostaphylos uva-ursi	COARSE FRAGMENT CONTENT: High.
MOSS: moderately well developed; dominated by lichens [45]. Cladina spp. Cladonia spp.	TERRAIN/PARENT MATERIALS: Colluvial veneers over bedrock.
	SOIL NAME: Orthic Eutric and Dystric Brunisols.
	HUMUS FORM: Xeromors.
	OTHER FEATURES: Organic horizons are thin, crusty when dry.

COMMENTS: The relative abundance of Arctostaphylos uva-ursi and the dominance of lichens rather than mosses in the "moss layer" are diagnostic for the Pine - Lichen ecosystem association.

PINE - LICHEN (SBSd/02)

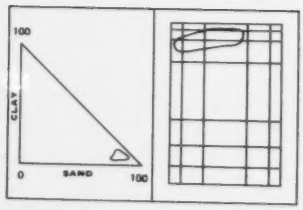
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Unacceptable	- Sxw.
Logging:	- summer or winter. - summer log if natural regeneration is planned. - minimize disturbance where soils are thin over bedrock.
Site preparation:	
Mechanical	- may be required.
Prescribed fire	- DO NOT BURN. - loss of organic matter on these sites will result in loss of site productivity.
Brush hazard:	- not expected.
Reforestation:	- site should be naturally regenerated if possible. - plugs may be necessary if planting on rocky soils.
Other comments:	- these ecosystems are better suited for purposes other than timber production.

PINE - LICHEN - MOSS (SBSd/03)

SLOPE POSITIONS: Level or upper slope and crest.

SLOPE RANGE: 0-20%.

ASPECT: Level or, if on slope, tending to southerly.



VEGETATION LAYERS	SOILS
TREE: stands sometimes understocked, with fairly open canopies, poor tree growth [34]. Pl Sxw At	DRAINAGE: Rapid.
SHRUB: poorly developed; low shrubs except for tree regeneration [13]. Pl (Sxw) Shepherdia canadensis	EFFECTIVE ROOTING: Approx. to bottom of Bm horizon.
HERB: poorly to moderately developed [45]. Arctostaphylos uva-ursi Linnaea borealis (Oryzopsis spp.)	COARSE FRAGMENT CONTENT: Sometimes greater than 35%.
MOSS: moderately well developed; diverse [75]. Pleurozium schreberi Cladina spp. (Cladonia spp.) (Peltigera spp.)	TERRAIN/PARENT MATERIALS: Glaciofluvial terraces; colluvial and morainal veneers over bedrock. SOIL NAME: Orthic Dystric Brunisols. HUMUS FORM: Xeromors. OTHER FEATURES: Organic horizons are thin, crusty when dry.

COMMENTS: The Pine - Lichen - Moss ecosystem association is much more common than the Pine - Lichen e.a., has less Arctostaphylos uva-ursi, and has an abundance of both mosses and lichens on the forest floor.

PINE - LICHEN - MOSS (SBSd/03)

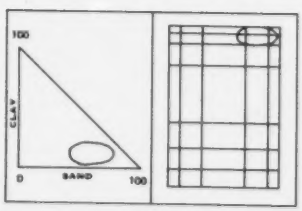
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Unacceptable	- Sxw.
Logging:	- summer or winter. - summer log if natural regeneration is planned. - minimize disturbance where soils are thin over bedrock.
Site preparation:	
Mechanical	- may be required.
Prescribed fire	- DO NOT BURN. - loss of organic matter on these sites will result in loss of site productivity.
Brush hazard:	- not expected.
Reforestation:	- site should be naturally regenerated if possible. - plugs may be necessary if planting on rocky soils.
Other comments:	- these ecosystems are better suited for purposes other than timber production.

SASKATOON - WHEATGRASS SCRUB/STEPPE
(SBSd/04)

SLOPE POSITIONS: Middle and upper.

SLOPE RANGE: 25-80% (usually greater than 60%).

ASPECT: South, southwest.



VEGETATION LAYERS	SOILS
TREE: [0].	DRAINAGE: Good.
SHRUB: usually well developed and diverse, although not vigorous [46]. Amelanchier alnifolia; Symphoricarpos albus; Prunus virginiana; Rosa acicularis; Rocky Mountain juniper	TERRAIN/PARENT MATERIALS: Colluvial veneers over bedrock; (morainal veneers over bedrock and morainal blankets).
HERB: well developed and very diverse [82]. Agropyron trachycaulum; Phleum pratense; Galium boreale; Stipa richardsonii; Lathyrus nevadensis	SOIL NAME: Orthic Melanic, Sombric and Eutric Brunisols; (infrequently Dark Gray Luvisols).
MOSS: poorly developed [15]. Tortula ruralis	HUMUS FORM: Rhizomulls.
	OTHER FEATURES: All profiles show Ah development.

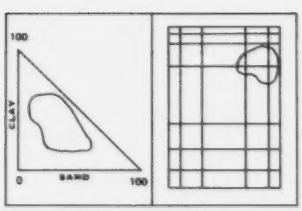
COMMENTS: The Saskatoon - Wheatgrass Scrub/Steppe ecosystem association represents a distinctive but somewhat heterogeneous assemblage of ecosystems in various stages of succession after fire and under different degrees of grazing or browsing pressure. THESE ECOSYSTEMS ARE NOT SUITABLE FOR TIMBER PRODUCTION.

GRASSLANDS (SBSd/05)

SLOPE POSITIONS: Upper, level.

SLOPE RANGE: 0-35%.

ASPECT: Southern or western (usually).



VEGETATION LAYERS	SOILS
TREE: [0].	DRAINAGE: Moderately good.
SHRUB: [2].	TERRAIN/PARENT MATERIALS: Morainal or lacustrine blankets.
HERB: very well developed, diverse [99]. *Poa pratensis* *P. gracillima* *P. interior* *Agropyron trachycaulum* *Bromus* spp. *Stipa richardsonii* *Taraxacum officinale* *Lathyrus nevadensis* *Schizachne purpurascens*	SOIL NAME: Dark Gray Luvisols and Orthic Melanic Brunisols.
MOSS: very sparse or lacking [2].	HUMUS FORM: Rhizomulls.
	OTHER FEATURES: Ah development is the key feature in profile development.

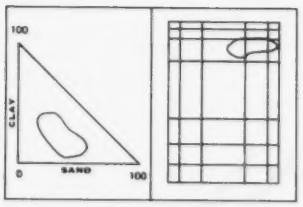
COMMENTS: Natural grassland is rare and local in the Sub-Boreal Spruce Zone. THESE ECOSYSTEMS ARE NOT SUITABLE FOR TIMBER PRODUCTION.

DOUGLAS-FIR - SOOPOLALLIE (SBSd/06)

SLOPE POSITIONS: Variable; middle, upper, crest, usually on or near bedrock outcrops and ridges.

SLOPE RANGE: 0-65%.

ASPECT: Variable (mainly southerly).



VEGETATION LAYERS	SOILS
TREE: canopy fairly open; trees widely spaced; stands sometimes with Douglas-fir veterans [46]. Fd (Sxw) SHRUB: poorly to moderately developed [40]. Fd (Sxw) Shepherdia canadensis HERB: sparse to poorly developed [17]. (Elymus glaucus) (Linnaea borealis) MOSS: moderately developed, sometimes with frequent lichens [45]. Pleurozium schreberi Cladonia spp.	DRAINAGE: Moderately good to rapid. EFFECTIVE ROOTING: Plentiful roots over a C or Bt in tills. COARSE FRAGMENT CONTENT: Sometimes greater than 35%. TERRAIN/PARENT MATERIALS: Colluvial veneers and blankets; morainal blankets. SOIL NAME: Orthic Dystric and Eutric Brunisols; Brunisolic Gray Luvisols. HUMUS FORM: Hemimors. OTHER FEATURES: Basic volcanic bedrock has been associated with the shallow, lithic profiles.

COMMENTS: These ecosystems are rare but distinctive in the study area.

DOUGLAS-FIR - SOOPOLALLIE (SBSd/06)

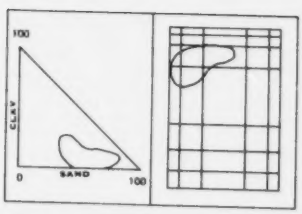
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Fd, Pl.
Acceptable	- Sxw.
Logging	- summer or winter. - avoid excessive disturbance.
Site preparation:	
Mechanical	- OK. - drag scarification should be adequate for providing planter access or exposed mineral soil for natural regeneration.
Prescribed fire	- DO NOT BURN. - loss of organic matter from these ecosystems will result in a decline in productivity.
Brush hazard:	- not expected; grasses may sometimes be a problem.
Reforestation:	- plant if required. - use plug stock on rocky soils.
Other comments:	- shelterwood or seedtree methods recommended for reproducing Fd. - these ecosystems also have good potential as native range for domestic animals.

SUBMESIC BUNCHBERRY - MOSS (SBSd/07)

SLOPE POSITIONS: All.

SLOPE RANGE: 0-40%.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: open canopy [53]. Sxw Pl	DRAINAGE: Moderately good to rapid.
SHRUB: poorly developed; few species [28]. Sxw (Pl) Rosa acicularis Spiraea betulifolia (Shepherdia canadensis)	EFFECTIVE ROOTING: Root restriction at top of Bt in tills; deeper rooting in fluvial deposits.
HERB: moderately developed; vigour merely poor to fair [41]. Cornus canadensis Linnaea borealis Arnica cordifolia	TERRAIN/PARENT MATERIALS: Morainal and glaciofluvial blankets.
MOSS: very well developed [86]. Pleurozium schreberi Hylocomium splendens Ptilium crista-castrensis (Dicranum polysetum)	SOIL NAME: Orthic and Eluviated Dystric Brunisols; Orthic and Brunisolic Gray Luvisols. HUMUS FORM: Hemimors.

COMMENTS: These ecosystems are similar to the Mesic Rose - Peavine - Moss ecosystems (SBSd/01). Generally, tree growth is slightly poorer, shrub and herb layers less developed and vigorous, and the moss layer better developed and/or more evident in the Submesic Bunchberry - Moss ecosystem association.

SUBMESIC BUNCHBERRY - MOSS (SBSd/07)

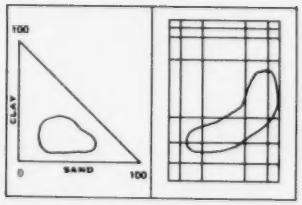
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- Sxw as a minor component.
Logging:	- summer or winter. - care should be taken to avoid compaction on fine-textured soils. - to achieve optimum site disturbance for natural regeneration, summer log with snipper cat and line skidders.
Site preparation:	
Mechanical	- OK. - can be used to reduce fire hazard instead of prescribed fire. - if scraping or scalping sites with fine-textured soil horizons, plant on the mounds rather than in the depressions or gouges.
Prescribed fire	- NOT RECOMMENDED. - organic matter is important for nutrient and moisture availability.
Brush hazard:	- expected only if disturbance is excessive. - grass competition may be a problem. - plant Pl if required.
Reforestation:	- if planting use stock with a well-developed root system.
Other comments:	- some of these ecosystems have a high potential for native range or tame pasture.

MOIST SHRUB - FORB (SBSd/08)

SLOPE POSITIONS: Middle and lower, or upper if gentle slopes.

SLOPE RANGE: 0-40%.

ASPECT: All.



VEGETATION LAYERS	SOILS

TREE: stands typically fairly open and mixed coniferous/deciduous; good growth [50].
Sxw
Pl
(At)

SHRUB: well developed; vigorous and diverse [53].
Sxw
Rosa acicularis
Viburnum edule
Lonicera involucrata

HERB: well developed; vigorous and diverse [66].
Lathyrus nevadensis
L. ochroleucus
Epilobium angustifolium
Rubus pubescens
Cornus canadensis
Linnaea borealis
(Smilacina racemosa)

MOSS: moderately to well developed [63].
Pleurozium schreberi
Ptilium crista-castrensis
Hylocomium splendens

DRAINAGE:
Moderately good.

EFFECTIVE ROOTING:
Root restriction at top of Bt in tills; deeper rooting in fluvial and colluvial materials.

TERRAIN/PARENT MATERIALS:
Predominantly morainal blankets; less frequently: fluvial, lacustrine, and colluvial blankets.

SOIL NAME:
Brunisolic, Orthic and Gleyed Gray Luvisols; (Orthic Dystric and Eutric Brunisols).

HUMUS FORM:
Hemimors; Mormoders.

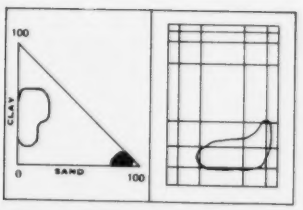
OTHER FEATURES:
Mottles often present in Bt horizon.

COMMENTS: This ecosystem association is more abundant in the northern parts of the subzone.

MOIST SHRUB - FORB (SBSd/08)

ACTIVITY OR CONCERN	
Species choice: Preferred	- Sxw and Pl. - Pl favoured on well-drained sites. - Sxw shows its best growth on the Nechako Plateau in this ecosystem unit.
Logging:	- winter or during dry periods in summer. - avoid compaction of fine-textured soils.
Site preparation: Mechanical	- OK. - a viable alternative to prescribed fire for reducing fire hazard. - if scalping or scraping fine-textured soil horizons, plant on mounds rather than in the depressions or gouges.
Prescribed fire	- OK. - avoid if advanced regeneration is acceptable. - burning should not significantly reduce the soil organic horizons.
Brush hazard:	- moderate - high. - deciduous trees often present; try to control sprouting and suckering.
Reforestation:	- plant Sxw, Pl (sturdy, vigorous stock).
Other comments:	- selection or shelterwood regeneration systems for natural regeneration of Sxw are options. - high potential for native range or tame pasture.

SPRUCE - HORSETAIL (SBSd/09)



SLOPE POSITIONS: Lower and toe slopes, and level or depressional sites.

SLOPE RANGE: 0-7%.

ASPECT: Variable or flat.

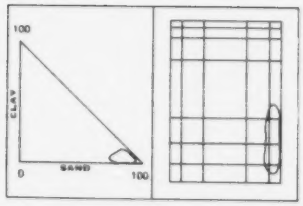
VEGETATION LAYERS	SOILS	
	Fluvial phase SBSd/09(a)	Lacustrine phase SBSd/09(b)
TREE: large, widely spaced trees in mature stands [53]. Sxw	TEXTURE: Sandy-skeletal.	Fine-clayey, fine-silty.
SHRUB: moderate to good development [56]. Sxw *Lonicera involucrata* *Viburnum edule* *Rosa acicularis* *Ribes lacustre* *Cornus sericea*	DRAINAGE: Good.	Poor.
	EFFECTIVE ROOTING: Deeper than in lacustrine phase.	
	COARSE FRAGMENT CONTENT: Variable.	
HERB: well developed, vigorous [66]. *Equisetum arvense* *E. pratense* *E. sylvaticum* *Calamagrostis canadensis*	TERRAIN/PARENT MATERIALS: Active fluvial blankets.	Lacustrine veneers over morainal or fluvial blankets.
	SOIL NAME: Orthic Dystric Brunisols.	Rego and Orthic Humic Gleysols.
MOSS: poorly to well developed but patchy [66]. *Mnium* spp. (*Brachythecium* spp.)	HUMUS FORM: Mormoders.	Hydromoders.
	OTHER FEATURES: Thin Ah usually present.	Water table within 50 cm of surface.

COMMENTS: The Spruce - Horsetail ecosystem association is often represented by seral stands of aspen and/or cottonwood with a lush understory of shrubs and herbs.

SPRUCE - HORSETAIL (SBSd/09)

ACTIVITY OR CONCERN	Fluvial phase SBSd/09(a)	Lacustrine phase SBSd/09(b)
Species choice:		
Preferred	- Sxw.	- Sxw.
Acceptable	- Pl.	- Pl (but too wet unless mounded).
Logging:	- winter or summer. - excessive disturbance will result in increased brush competition and possible erosion.	- WINTER ONLY.
Site preparation:		
Mechanical	- OK. - could accelerate soil erosion on active floodplains. - may increase brush competition.	- probably beneficial but not feasible. - sites often too wet for heavy equipment.
Prescribed fire	- NOT RECOMMENDED. - maintain organic matter on coarse-textured soils.	- beneficial but difficult.
Brush hazard:	- moderate - high.	- high - extreme.
	- mainly shrubs and deciduous trees; control sprouting and suckering.	
	- brushing and weeding probably required; plan for it.	
Reforestation:	- PLANT Sxw IMMEDIATELY (tall, large caliper stock).	
Other comments:	- selection regeneration system for natural regeneration of Sxw is an option. - cottonwood is an acceptable species on well-drained sites, if desired. - high potential for native range or tame pasture.	

COTTONWOOD BOTTOMLAND (SBSd/10)



SLOPE POSITIONS: Valley bottoms.

SLOPE RANGE: Level.

ASPECT: Flat.

VEGETATION LAYERS

TREE: in older stands, typically a main canopy of large widely spaced cottonwood with scattered spruce in the understory [46].
Act
(Sxw)

SHRUB: very well developed, vigorous [74].
Sxw
Cornus sericea
Lonicera involucrata
Viburnum edule
Rosa acicularis

HERB: moderately well developed and diverse, with good vigour but patchy [39].
Calamagrostis canadensis
Vicia americana
Elymus glaucus
Osmorhiza chilensis

MOSS: sparse or lacking [1].

SOILS

DRAINAGE:
Rapid.

COARSE FRAGMENT CONTENT:
Variable.

TERRAIN PARENT MATERIALS:
Active fluvial floodplains.

SOIL NAME:
Orthic Dystric Brunisols;
Regosols.

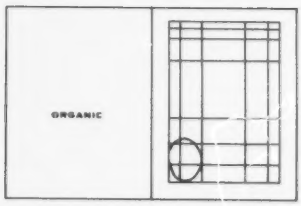
HUMUS FORM:
Moders.

COMMENTS: The distinctive landform and vegetation make the Cottonwood Bottomland ecosystem association unmistakable. It occurs in a wide range of seral stages.

COTTONWOOD BOTTOMLAND (SBSd/10)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sxw (spruce shows excellent growth in these ecosystems).
Acceptable	- Pl.
Logging:	- winter preferred. - if summer logged, minimize disturbance. - summer log during dry periods only.
Site preparation:	
Mechanical	- OK (probably required only after winter logging). - useful for producing spots suitable for planting. - method depends on quantity of slash.
Prescribed fire	- NOT RECOMMENDED. - burning could accelerate soil erosion on active floodplains and increase suckering and sprouting of deciduous trees.
Brush hazard:	- high - extreme. - plan for brushing and weeding following establishment of plantation.
Reforestation:	- PLANT Sxw IMMEDIATELY (tall, large caliper stock).
Other comments:	- selection reproduction method for natural regeneration of Sxw is an option. - cottonwood is an acceptable species, if desired.

SPRUCE SWAMPS (SBSd/11)



SLOPE POSITIONS: Level and depressional.

SLOPE RANGE: 0 (level).

ASPECT: Not applicable.

VEGETATION LAYERS	SOILS
TREE: trees scattered and clumped, rarely forming a canopy [30]. Sb Sxw	DRAINAGE: Poor.
SHRUB: moderate to good development [37]. Sb Sxw Betula glandulosa (Salix barclayi) (Ledum groenlandicum) (Alnus incana)	TERRAIN/PARENT MATERIALS: Organic blankets. SOIL NAME: Mesisols and (Fibrisols). HUMUS FORM: Histomors; Histomoders.
HERB: well developed [73]. Carex disperma Equisetum arvense E. fluviatile Potentilla palustris	OTHER FEATURES: Soils are usually more than 1 m deep.
MOSS: well developed but not continuous [75]. Tomenthypnum nitens Sphagnum spp. (Aulacomnium palustre) (Drepanocladus spp.) (Calliergon spp.) (Mnium spp.)	

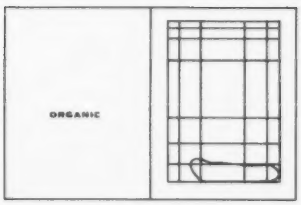
COMMENTS: Swamps differ from bogs in having more available nutrients and thus better tree growth, more vigorous shrubs and herbs, less dominance by Sphagnum mosses, and a greater abundance of "rich" mosses such as Tomenthypnum nitens and various Drepanocladus, Calliergon, and Mnium species. THESE ECOSYSTEMS ARE NOT SUITABLE FOR TIMBER PRODUCTION.

BLACK SPRUCE BOGS (SBSd/12)

SLOPE POSITIONS: Depressional.

SLOPE RANGE: 0 (level).

ASPECT: Not applicable.



VEGETATION LAYERS	SOILS
TREE: trees scattered and clumped, with very poor growth [24]. 5b	DRAINAGE: Poor to very poor.
SHRUB: moderately developed, but not vigorous [52]. 5b Ledum groenlandicum	TERRAIN/PARENT MATERIALS: Organic blankets.
HERB: poorly developed, dominated by dwarf evergreen shrubs rather than sedges or forbs [18]. Caultheria hispidula (Vaccinium oxycoccos)	SOIL NAME: Fibrisols, Mesisols, and Humisols. HUMUS FORM: Histomors.
MOSS: very well developed [96]. Sphagnum spp. Pleurozium schreberi (Icmadophila ericetorum) (Cladina spp.) (Cladonia spp.)	OTHER FEATURES: Fibric horizons dominate upper 40 cm of soil profile.

COMMENTS: Bog ecosystems are very low in available nutrients, resulting in a very distinctive vegetation of poorly growing or stunted black spruce with a ground cover of Labrador tea and peat moss. THESE ECOSYSTEMS ARE NOT SUITABLE FOR TIMBER PRODUCTION.

6 THE SBSel VARIANT

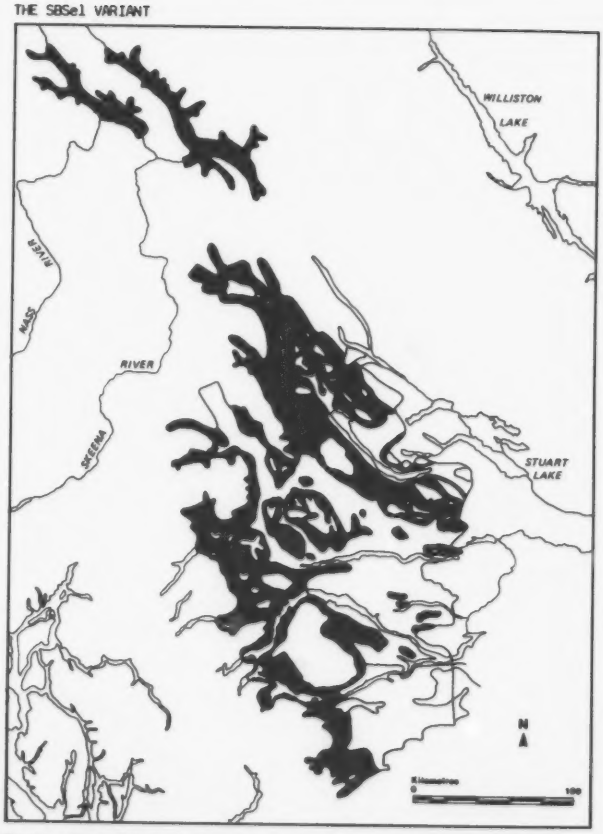


FIGURE 10. The Moist Cool Central Sub-Boreal Spruce subzone, Babine Lake variant (SBSel) in the Prince Rupert Forest Region.

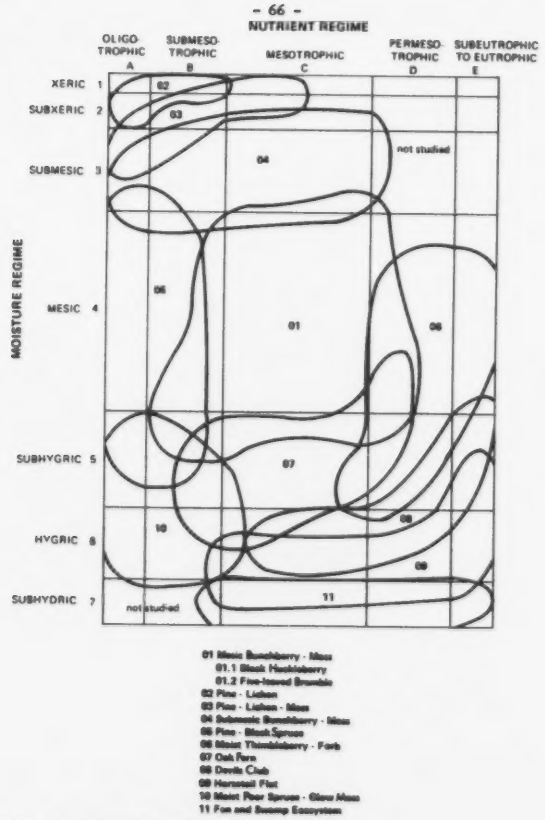


FIGURE 11. Edatopic grid of the SBSel.

6.1 Key to Ecosystem Associations and Subassociations of the SBSel

A Ecosystems with below average to poor tree growth; soils either too dry or too wet and/or low in nutrients ..... B

AA Ecosystems with average or better tree growth and moisture/nutrient conditions ..... G

B Dry Pl-dominated ecosystems on well to rapidly drained, coarse-textured glaciofluvial materials or on shallow materials over bedrock C

BB Wet or moist ecosystems; organic soils or imperfectly drained mineral soils ..... E

C *Arctostaphylos uva-ursi* rare or lacking

SUBMESIC BUNCHBERRY - MOSS (SBSel/04)

CC *Arctostaphylos uva-ursi* common to abundant ..... D

D Moss layer dominated by lichens

PINE - LICHEN (SBSel/02)

DD Moss layer with roughly equivalent cover of mosses and lichens

PINE - LICHEN - MOSS (SBSel/03)

E Trees often stunted; shrub layer dominated by *Salix* spp. and *Betula glandulosa*; herb layer, by *Carex* spp.; moss layer, by *Sphagnum* spp.; organic soils predominate

FEN AND SWAMP ECOSYSTEMS (SBSel/11)

EE Trees growing poorly but not stunted; moss layer dominated by species other than *Sphagnum*; poor, moist mineral soils ..... F

F Sb common to abundant in subcanopy

PINE - BLACK SPRUCE (SBSel/05)

FF Sb rare or lacking in subcanopy

MOIST POOR SPRUCE - FEATHER MOSS (SBSel/10)

G Ecosystems with shrub layers dominated by Vaccinium membranaceum and Bl regeneration ..... H

H Gymnocarpium dryopteris abundant and vigorous; Oplopanax horridus only common and of fair vigour

OAK FERN (SBSel/07)

HH Gymnocarpium dryopteris and Oplopanax horridus rare or lacking

MESIC BUNCHBERRY - MOSS (SBSel/01)

(i) Vaccinium membranaceum abundant

Black huckleberry subassociation (SBSel/01.1)

(ii) Vaccinium membranaceum common but not abundant; Rubus pedatus abundant

Five-leaved bramble subassociation (SBSel/01.2)

GG Ecosystems with shrub layers dominated by species other than Vaccinium membranaceum and Bl regeneration I

I Both Oplopanax horridus and Gymnocarpium dryopteris abundant and vigorous

DEVIL'S CLUB (SBSel/08)

II Oplopanax horridus rare or lacking ..... J

J Equisetum spp. abundant; herb layer well developed and vigorous; Mnium spp. common to abundant in moss layer

HORSETAIL FLAT (SBSel/09)

JJ Equisetum spp. rare or lacking; shrub and herb layers diverse and vigorous; Mnium spp. rare or lacking in moss layer

MOIST THIMBLEBERRY - FORB (SBSel/06)

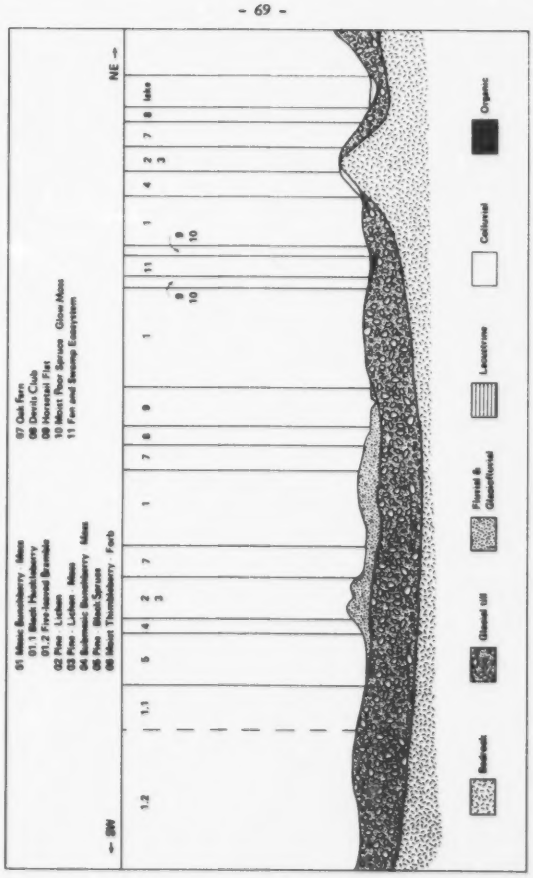


FIGURE 12. Schematic sequence of ecosystems in the SBSel landscape.

6.2 Prominence of the Major Species of the SBSel

Figure 13 depicts the relative prominence of several species that typify the SBSel. Prominence is a measure derived from both presence and plant cover. For example if a species was present on four of five plots (i.e., presence of 80%) and had a mean cover on the five plots of 7%, its prominence would be equal to:

(square root of 80)x(7) = 63 (rounded off to nearest whole number)

Figure 13 only includes species having a prominence value of 50 or more in one or more ecosystems. To get a firm idea of this cut-off value, note that a species that always occurs would have to have a cover of 5% or more. Clearly, this would not easily be overlooked in the field.

Figure 13 presents circles whose diameters are proportional to the prominence value. The diameter equivalent to a prominence value of 50 is about 2.3 mm.

6.3 Description and Interpretation of SBSel Ecosystems.

Following Figure 13 are two synoptic tables. Table 7 presents selected physical and edaphic features associated with the ecosystem units; Table 8 summarizes silvicultural interpretations for these units. The series of facing pages describe (left side) and interpret (right side) the various ecosystem units. The small figure that appears in the upper right of the descriptive page includes an edatopic grid with an outlined area indicating the usual moisture and nutrient conditions for the ecosystem in question. It also includes a small soil textural triangle with an outlined area(s) indicating the usual range of textures associated with the ecosystem. If two soil texture phases have been defined, they are indicated by white and black areas. The key to the white and black areas is located under the soils column adjacent to the phase subheadings. The black areas always apply to the coarser textured phase.

Under the vegetation column, the figures that appear in square brackets, e.g. [45], indicate the average cover of the tree, shrub, herb, and moss layers.

FIGURE 13. Prominence values for the major species of the SBSel.

FIGURE 13. (Continued).

TABLE 7. Habitat features of the ecosystem units of the SBSel

Ecosystem unit	Subtype	Slope range (%)	Aspect	Parent materials	Particle size class[1]	Drainage	Soil class[1]	Humus form class[2] and depth(cm)	Rooting depth (cm)
Pine - Lichen	1-2/A-B	0-30	flat, S	glaciofluvial; residual	sandy, sandy-skeletal	rapid	Dystric Brunisols; Humo-Ferric Podzols	Mormoder 3	90
Pine - Lichen - Moss	2/B-C	0-15	all	glaciofluvial; eolian; residual	sandy-skeletal, loamy-skeletal	rapid	Dystric Brunisols	Hemimor 4	55
Subxeric Huckleberry - Moss	3/B-C	0-50	all						
Coarse textured phase				fluvial; eolian; glaciofluvial	coarse-loamy, sandy	good	Dystric Brunisols; Humo-Ferric Podzols	Hemimor 10	50
Fine textured phase				eolian	fine-loamy	mod. good	Gray Luvisols	Hemimor 5	47
Mesic Huckleberry - Moss, black huckleberry subassociation	4/C	0-40	all						
Coarse textured phase				eolian; glaciofluvial	coarse-loamy, loamy skeletal	good - mod. good	Humo-Ferric Podzols; Dystric Brunisols	Hemimor 9	40
Fine textured phase				eolian	fine-loamy	mod. good - imperfect	Gray Luvisols; Dystric Brunisols	Hemimor; Humode.. 9	30
Mesic Huckleberry - Moss, five-leaved bramble subassociation	4-5/C-D	0-27	all (N,E)						
Coarse textured phase				glaciofluvial; fluvial	coarse-loamy, sandy-skeletal	rapid - mod. good	Dystric Brunisols; Regosols	Hemimor 6	45
Fine textured phase				eolian	fine-loamy, clayey	mod. good - imperfect	Gray Luvisols	Hemimor 8	20
Pine - Bluish Sphuse	6-7/C-D	0-5	flat, W	eolian; fluvial	fine-loamy, coarse-loamy	mod. good - imperfect	Gray Luvisols; Dystric Brunisols	Hemimor 7	50
Moist Thimbleberry - Forb	8-9/D-E	0-60	all (S,W)	eolian; fluvial; colluvial	fine-loamy, coarse-loamy, loamy-skeletal	mod. good - imperfect	Brunisols; Gray Luvisols; Gleysols	Mormoder; Hemimor 12	94
Oak Fern	5/C-D	2-70	all						
Coarse textured phase				eolian; colluvial	coarse-loamy, loamy-skeletal	mod. good	Humo-Ferric Podzols; Dystric Brunisols	Mormoder; Hemimor 10	94
Fine textured phase				eolian	fine-loamy, clayey	imperfect	Gray Luvisols	Mormoder; Leptomoder; Hemimor 12	55
Devil's Club	5-6/D-E	2-55	all						
Coarse textured phase				fluvial	coarse-loamy, loamy-skeletal, sandy-skeletal	rapid - good	Dystric and Eutric Brunisols	Hemimor; Humimor; Mormoder 17	43
Fine textured phase				eolian	fine-loamy, clayey	mod. good - imperfect	Gray Luvisols; Gleysols; Podzols; Eutric Brunisols	Hemimor; Humimor; Mormoder 9	41
Horsetail Flat	6-7/C-E	0-10	flat						
Coarse textured phase				fluvial	coarse-loamy	mod. good - good	Dystric Brunisols; Cumulic Regosols	Leptomoder; Mormoder 6	50
Fine textured phase				eolian; lacustrine	fine-loamy	poor	Gleysols	Hydromoder; Hydromor 26	21
Moist Poor Spruce - Slow Moss	5-6/A-B	0-19	all	glaciofluvial; eolian; lacustrine	loamy, sandy or clayey	imperfect - poor	Gleyed Gray Luvisols; Rego and Humic Gleysols	Hemimor; Hydromoder 23	23
Fens and Swamps	7/C-E	0	flat	organic	fibric and mesic	very poor	Fibrisols and Mesisols	Histomor 4	39

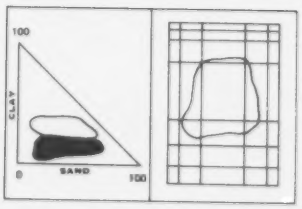
1 Particle size classes and soil classes follow Canada Soil Survey Committee (1978).
2 Humus form classes after Klinka et al. (1981).

TABLE 8. Summary of silvicultural prescriptions and guidelines for the SBSel

Ecosystem unit	Logging	Prescribed fire	Species selection[1] Pref.	Accept.	Unaccept.	Regeneration method	Brush[2] potential	Brushing and weeding
Pine - Lichen	AVOID	AVOID	Pl	-	Sxw, Bl	natural or plant	very low	-
Pine - Lichen - Moss	summer[3] (winter)	AVOID	Pl	-	Sxw, Bl	natural or plant	very low	-
Subxeric Bunchberry - Moss	summer[3] (winter)	AVOID	Pl	-	Sxw, Bl	natural or plant	very low	-
Mesic Bunchberry - Moss, black huckleberry subassociation								
Coarse textured phase	summer[3] (winter)	use with caution	Pl	Sxw[4]	Bl	natural or plant	low[4]	-
Fine textured phase	winter, summer	OK[5]	Pl	Sxw[4]	Bl	natural or plant	low - moderate	-
Mesic Bunchberry - Moss, five-leaved bramble subassociation								
Coarse textured phase	summer, winter	OK[5]	Pl,Sxw	-	Bl	natural or plant	low moderate	-
Fine textured phase	winter, summer (dry spells)	OK	Sxw,Pl	Bl[4]	-	plant or natural	low - moderate	as required
Pine - Black Spruce	winter, summer (dry spells)	OK	Pl	Sxw,Sb[4]	Bl	plant or natural	low	-
Moist Thimbleberry - Forb	winter, summer (dry spells)	OK	Sxw,Pl	Bl[4]	-	plant	moderate-high	usually required
Oak Fern	winter, summer (dry spells)	OK	Sxw,Pl	Bl	-	plant	moderate	as required
Devil's Club								
Coarse textured phase	winter, summer (dry spells)	OK	Sxw,Pl	Bl	-	plant	high	usually required
Fine textured phase	winter	OK	Sxw	Bl,Pl[4]	-	plant	very high	REQUIRED
Horsetail Flat								
Coarse textured phase	summer, winter	not recommended	Sxw	Pl,Bl[4]	-	plant immediately	very high	REQUIRED
Fine textured phase	winter	OK (difficult)	Sxw	Bl, Pl[4]	-	plant immediately	very high	REQUIRED
Moist Poor Spruce - Glow Moss	winter, summer (dry spells)	OK	Pl	Sxw	Bl, Sb	natural or plant	low	-
Fens and Swamps	AVOID	-	-	-	-	-	-	-

[1] A preferred species for a managed forest is ecologically appropriate to the site and best suited to management objectives. An acceptable species is also ecologically appropriate, but less so than a preferred species, or is less suited to management objectives. An unacceptable species will not reach merchantable size in a reasonable time.
[2] All deciduous trees, shrubs, and herbs that inhibit the establishment and growth of selected conifers.
[3] Summer logging if aiding for natural regeneration.
[4] As a minor component (less than 20% of total crop trees present) of the stand; natural regeneration only.
[5] If only the litter layer is removed, and if followed by planting.
[6] Sitka alder (Alnus viridis ssp. sinuata) can cause problems.

MESIC BUNCHBERRY - MOSS,
BLACK HUCKLEBERRY SUBASSOCIATION
(SBSel/01.1)



SLOPE POSITIONS: Virtually all slope positions except crest.

SLOPE RANGE: 0-40%.

ASPECT: All.

VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSel/01.1(a)	Fine textured phase SBSel/01.1(b)
TREE: stands usually well stocked, trees with fair to good growth [53]. Pl Bl Sxw	TEXTURE: Coarse-loamy, loamy-skeletal.	Fine loamy.
	DRAINAGE: Good to moderately good.	Moderately good to imperfect.
SHRUB: usually moderately developed [55]. Bl (Sxw) Vaccinium membranaceum	EFFECTIVE ROOTING:	Generally shallow due to compact subsurface horizons.
HERB: moderately developed [50]. Cornus canadensis Rubus pedatus Linnaea borealis Arnica cordifolia	COARSE FRAGMENT CONTENT: Variable.	
	TERRAIN/PARENT MATERIALS: Morainal blankets.	Morainal blankets.
MOSS: very well developed; typically a thick carpet of feather mosses [82]. Pleurozium schreberi Ptilium crista-castrensis Hylocomium splendens	SOIL NAME: Humo-Ferric Podzols; Orthic and Eluviated Dystric Brunisols.	Brunisolic and Orthic Gray Luvisols; (Orthic Dystric Brunisols).
	HUMUS FORM: Hemimors.	Hemimors; Mormoders.
	OTHER FEATURES: Tendency towards Ae formation over time.	Mottling not uncommon.

COMMENTS: This is the most common subassociation of the Mesic Bunchberry - Moss ecosystem association in the SBSel.

MESIC BUNCHBERRY - MOSS,
BLACK HUCKLEBERRY SUBASSOCIATION (SBSel/01.1)

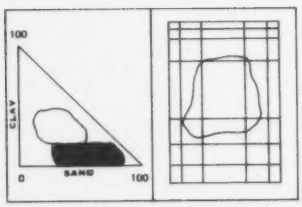
ACTIVITY OR CONCERN	Coarse textured phase SBSel/01.1(a)	Fine textured phase SBSel/01.1(b)
Species choice:		
Preferred	- Pl.	- Pl.
Acceptable	- Sxw as a minor component; natural regeneration only.	- Sxw as a minor component.
Unacceptable	- Bl.	- Bl.
Logging:	- if aiming for naturals, summer log with snipper cat and line skidders for optimum site disturbance.	- possible soil compaction if logged in summer. - potential for windfall (Sxw, Pl) when root-restricting, structureless, fine-textured horizons are close to surface; adjust block layout.
Site preparation:		
Mechanical	- OK. - probably only necessary following winter logging. - alternative for reducing fire hazard.	- OK. - will expose fine-textured soil horizons. - if scraping or scalping, plant on mounds rather than in the depressions or gouges.
Prescribed fire	- USE WITH CAUTION. - organic matter important for moisture retention. - if required, the burn should only remove the litter (L) layer.	- USE WITH CAUTION.
Brush hazard:	- not expected unless disturbance is excessive.	
Reforestation:	- plugs best on rocky soils. - plant if required; if opting for naturals ensure adequate cones, viable seed, mineral soil exposure, and suitable climatic conditions.	- possible frost-heaving on non-insulated, silty soils.
Other comments:		- establishment of deep-rooting ground cover to improve growing conditions for tree seedlings is an option.

MESIC BUNCHBERRY - MOSS,
FIVE-LEAVED BRAMBLE SUBASSOCIATION
(SBSel/01.2)

SLOPE POSITIONS: Variable; if upper slope, gradients tend to be lower; generally occurs downslope of contiguous SBSel/01.1.

SLOPE RANGE: 0-27%.

ASPECT: Variable.



VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSel/01.2(a)	Fine textured phase SBSel/01.2(b)
TREE: stands usually well stocked; tree growth good [54]. Sxw Bl Pl	TEXTURE: Coarse-loamy, sandy-skeletal.	Fine-loamy, clayey.
	DRAINAGE: Moderately good to rapid.	Moderately good to imperfect.
SHRUB: moderately developed [40]. Bl (Sxw) (Viburnum edule) (Rosa acicularis) (Vaccinium membranaceum)	EFFECTIVE ROOTING: Usually greater than 60 cm.	
	COARSE FRAGMENT CONTENT: Sometimes greater than 35%.	
	TERRAIN/PARENT MATERIALS: Fluvial and glacio-fluvial terraces and fans.	Morainal blankets.
HERB: moderately developed [48]. Cornus canadensis Rubus pedatus (Linnaea borealis) (Lycopodium annotinum)	SOIL NAME: Orthic and Eluviated Dystric Brunisols; Orthic Regosols.	Orthic, Brunisolic and Podzolic Gray Luvisols (may have Gleyed subgroups).
MOSS: very well developed [83]. Pleurozium schreberi Ptilium crista-castrensis Hylocomium splendens	HUMUS FORM: Hemimors.	Hemimors.
	OTHER FEATURES: Older profiles show trend towards Ae formation.	Seepage often present in early part of growing season.

COMMENTS: The SBSel/01.2 or Rubus subassociation can be distinguished from the SBSel/01.1 or Vaccinium subassociation by the lack or relative scarcity of V. membranaceum and the presence and abundance of R. pedatus. Due to the ubiquitous fire history of the SBSel, a diverse array of successional plant communities exist on many zonal sites. Seral variations typically include a greater abundance of lodgepole pine, trembling aspen, and sometimes Alnus viridis.

MESIC BUNCHBERRY - MOSS,
FIVE-LEAVED BRAMBLE SUBASSOCIATION (SBSe1/01.2)

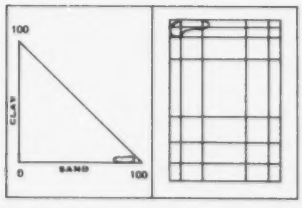
ACTIVITY OR CONCERN	Coarse textured phase SBSe1/01.2(a)	Fine textured phase SBSe1/01.2(b)
Species choice:		
Preferred	- Pl and/or Sxw. - Pl favoured on well-drained sites.	- Sxw and/or Pl. - Sxw favoured on moister sites.
Acceptable		- Bl as a minor component.
Unacceptable	- Bl.	
Logging:	- winter or summer. - summer log with snipper cat and line skidders for optimum site disturbance.	- winter or summer (during dry periods). - potential for windfall (Sxw, Pl) when root restricting, structureless, fine-textured, or compact horizons near surface; adjust block layout.
Site preparation:		
Mechanical	- OK, especially after winter logging.	- OK; if scraping or scalping fine-textured horizons, plant on mounds rather than in the depressions or gouges. - drag equipment adequate for providing planter access or exposing mineral soil for natural regeneration.
Prescribed fire	- use with care. - if required, the burn should only remove the litter (L) layer.	- OK for Pl establishment, not recommended for Sxw. - if Ah is not present, burning should remove no more than the litter (L) layer.
Brush hazard:	- not expected unless disturbance is excessive.	- low - moderate.
Reforestation:	- plant if required. - plugs would be best on rocky soils. - if brush competition expected, do not rely on natural regeneration; PLANT.	- plant if required. - possible frost-heaving on non-insulated, silty soils.
Other comments:	- shelterwood or seedtree regeneration systems for natural regeneration of Sxw are options.	

PINE - LICHEN (SBSel/02)

SLOPE POSITIONS: Level or crest; on fluvial terraces or along bedrock ridges.

SLOPE RANGE: 0-30%.

ASPECT: Variable; if on slope, tends to southerly.



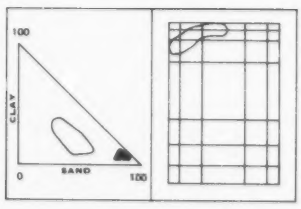
VEGETATION LAYERS	SOILS
TREE: open stands of poorly growing trees [31]. Pl	DRAINAGE: Rapid.
SHRUB: sparse; poor vigour [15]. Pl (Bl) (Sxw) Vaccinium membranaceum	EFFECTIVE ROOTING: Deep.
HERB: poorly developed [25]. Arctostaphylos uva-ursi	COARSE FRAGMENT CONTENT: Sometimes greater than 35%.
MOSS: moderately developed [73]. Cladonia spp. Cladina spp.	TERRAIN/PARENT MATERIALS: Glaciofluvial outwash; kame and fluvial terraces; colluvial veneers.
	SOIL NAME: Orthic and Eluviated Dystric Brunisols; Orthic Humo-Ferric Podzols.
	HUMUS FORM: Xeromors.
	OTHER FEATURES: Thin, crusty organic horizons predominate.

COMMENTS: The relative abundance of Arctostaphylos uva-ursi and the dominance of the "moss layer" by lichens rather than mosses are diagnostic for the Pine - Lichen ecosystem association.

PINE - LICHEN (SBSel/02)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Unacceptable	- Sxw, Bl.
Logging:	- summer and winter. - summer log when possible to provide disturbance for natural regeneration.
Site preparation:	
Mechanical	- OK. - screefing may be adequate because of the thin organic horizons.
Prescribed fire	- DO NOT BURN. - loss of organic matter will decrease site productivity.
Brush hazard:	- not expected.
Reforestation:	- natural regeneration of Pl preferred. - plant Pl if required.
Other comments:	- these ecosystems are marginal for timber production.

PINE - LICHEN - MOSS (SBSel/03)



SLOPE POSITIONS: Variable, all except toe slopes.

SLOPE RANGE: 0-15%.

ASPECT: Variable.

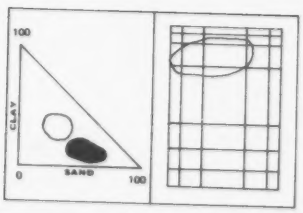
VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSel/03(a)	Lithic phase SBSel/03(b)
TREE: [37]. Pl Sxw	TEXTURE: Sandy-skeletal.	Loamy-skeletal.
	DRAINAGE: Rapid.	Moderately good to rapid.
SHRUB: moderately developed; fair vigour [53]. Bl (Sxw) (Pl) Vaccinium membranaceum	COARSE FRAGMENT CONTENT: 20-60% (by volume).	
	TERRAIN/PARENT MATERIALS: Glaciofluvial out-wash (terraces and fans).	Morainal veneers; residual materials over bedrock.
HERB: poorly developed [22]. Arctostaphylos uva-ursi Linnaea borealis Chimaphila umbellata Vaccinium caespitosum	SOIL NAME: Orthic and Eluviated Dystric Brunisols.	Eluviated Dystric Brunisols; Orthic Regosols.
MOSS: moderately well developed; diverse [82]. Pleurozium schreberi Cladina spp. (Stereocaulon tomentosum) (Polytrichum juniperinum) (Dicranum fuscescens)	HUMUS FORM: Xeromors.	Xeromors.
	OTHER FEATURES: Thin surface organic horizons.	Shallow soil.

COMMENTS: The Pine - Lichen - Moss ecosystem association is more common in the study area than the Pine - Lichen ecosystem association, has less Arctostaphylos uva-ursi, and has a "moss" layer often with roughly equivalent amounts of lichens and mosses.

PINE - LICHEN - MOSS (SBSe1/03)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Unacceptable	- Sxw, Bl.
Logging:	- summer and winter. - summer log when possible to provide disturbance for natural regeneration.
Site preparation:	
Mechanical	- OK. - screefing may be adequate because of the thin organic horizons.
Prescribed fire	- DO NOT BURN. - loss of organic matter will decrease site productivity.
Brush hazard:	- not expected.
Reforestation:	- natural regeneration of Pl preferred. - plant Pl if required.
Other comments:	- these ecosystems are marginal for timber production.

SUBMESIC BUNCHBERRY - MOSS (SBSel/04)



SLOPE POSITIONS: Middle, upper and crest.

SLOPE RANGE: 0-50%.

ASPECT: Variable.

VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSel/04(a)	Fine textured phase SBSel/04(b)
TREE: young stands often densely stocked [56]. Pl Bl Sxw	TEXTURE: Coarse-loamy, sandy.	Fine-loamy.
	DRAINAGE: Good.	Moderately good.
	EFFECTIVE ROOTING Deep.	Clay enrichment of Bt horizon restricts rooting.
SHRUB: poorly to moderately developed, with fair vigour [37]. Bl Sxw Vaccinium membranaceum Rosa acicularis	COARSE FRAGMENT CONTENT: Variable (sometimes greater than 35%).	
HERB: generally poorly developed and with only fair vigour [38]. Cornus canadensis Linnaea borealis Epilobium angustifolium (Aster conspicuus)	TERRAIN/PARENT MATERIALS: Fluvial and glaciofluvial blankets; occasionally morainal veneers over bedrock.	Morainal blankets; less commonly morainal veneers over bedrock.
MOSS: well developed but species-poor [70]. Pleurozium schreberi Ptilium crista-castrensis (Peltigera spp.)	SOIL NAME: Orthic and Eluviated Dystric Brunisols; Orthic Humo-Ferric Podzols.	Orthic and Brunisolic Gray Luvisols.
	HUMUS FORM: Hemimors.	Hemimors.

COMMENTS: This ecosystem association has little or no Hylocomium splendens in contrast to the Mesic Bunchberry - Moss ecosystem association.

SUBMESIC BUNCHBERRY - MOSS (SBSel/04)

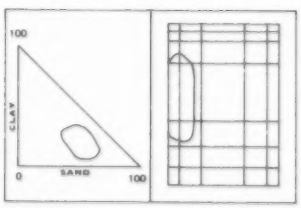
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Unacceptable	- Sxw, Bl.
Logging:	- summer and winter. - summer log when possible to provide disturbance for natural regeneration. - increased susceptibility to windthrow on fine textured phases.
Site preparation:	
Mechanical	- OK. - preferable alternative to burning for reducing fire hazard.
Prescribed fire	- DO NOT BURN. - loss of organic matter will reduce site productivity.
Brush hazard:	- not expected.
Reforestation:	- plant Pl if required. - use plugs on rocky soil. - for natural Pl establishment have adequate cones, viable seed, adequate mineral soil exposure, and suitable climatic factors.

PINE - BLACK SPRUCE (SBSel/05)

SLOPE POSITIONS: On level terrain or gentle lower slopes.

SLOPE RANGE: 0- 5%.

ASPECT: Flat or northerly.



VEGETATION LAYERS	SOILS

TREE: trees typically small; densely stocked [43].
Pl
Sb
Sxw

SHRUB: moderately developed; all low shrubs except for tree regeneration [32].
Bl
Sxw
Sb
Ledum groenlandicum
Vaccinium membranaceum

HERB: moderately well developed [61].
Cornus canadensis
Vaccinium caespitosum
Gaultheria hispidula
Petasites palmatus
Lycopodium annotinum

MOSS: usually a thick carpet of feathermosses [95].
Pleurozium schreberi
Ptilium crista-castrensis
Peltigera spp.
(Polytrichum spp.)

DRAINAGE:
Moderately good to imperfect.

EFFECTIVE ROOTING:
Root restriction due to fine textured subsurface horizon(s).

TERRAIN/PARENT MATERIALS:
Morainal blankets (with occasional fluvial veneers).

SOIL NAME:
Orthic and Brunisolic Gray Luvisols; occasionally Orthic Dystric Brunisols.

HUMUS FORM:
Hemimors.

OTHER FEATURES:
Soil temperatures are low during growing season.

COMMENTS: A main canopy of pine with a secondary canopy of black spruce typifies this ecosystem association. Hylocomium splendens is absent or sparse in the "moss" layer.

PINE - BLACK SPRUCE (S8Sel/05)

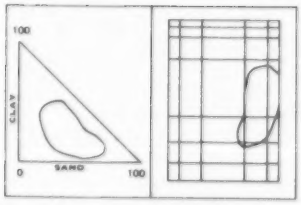
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- Sxw, Sb as a minor component.
Unacceptable	- Bl.
Logging:	- winter. - dry periods in summer. - windthrow potential for Pl, Sxw, Sb.
Site preparation:	
Mechanical	- OK. - if scraping or scalping on fine-textured soils, plant on mounds rather than in the depressions or gouges.
Prescribed fire	- OK, except on sandy soils. - will reduce thick organic matter accumulations found in older stands and probably improve soil temperatures.
Brush hazard:	- not expected.
Reforestation:	- natural regeneration of Pl preferred. - plant if required.

MOIST THIMBLEBERRY - FORB (SBSe1/06)

SLOPE POSITIONS: Middle, lower, and toe slopes.

SLOPE RANGE: 0-60% (usually less than 30%).

ASPECT: Variable but southerly more common.



VEGETATION LAYERS	SOILS
TREE: stands typically fairly open, often with a significant deciduous component [50]. Sxw At Pl (Bl)	DRAINAGE: Moderately good to imperfect. TERRAIN/PARENT MATERIALS: Morainal, fluvial, and colluvial blankets.
SHRUB: generally well developed and vigorous [60]. (Sxw) (Bl) Rubus parviflorus Viburnum edule Lonicera involucrata Ribes lacustre Rosa acicularis Cornus sericea (Alnus viridis ssp. sinuata)	SOIL NAME: Orthic Melanic, Sombric, Eluviated, and Dystric Brunisols; Brunisolic Gray Luvisols; and infrequently Humic Luvic Gleysols. HUMUS FORM: Mormoders; Hemimors.
HERB: moderately well developed; vigorous and diverse [64]. Rubus pubescens Cornus canadensis Epilobium angustifolium Arnica cordifolia Osmorhiza chilensis Smilacina racemosa Thalictrum occidentale	OTHER FEATURES: Ah horizon often present.
MOSS: sparse to moderately developed [53]. Pleurozium schreberi Ptilium crista-castrensis Rhytidiadelphus triquetrus	

COMMENTS: The shrub and herb layers of mature forest in this ecosystem association generally are more diverse and vigorous than those of any other ecosystem association in the SBSel, except perhaps the Devil's Club e.a.

MOIST THIMBLEBERRY - FORB (SBSe1/06)

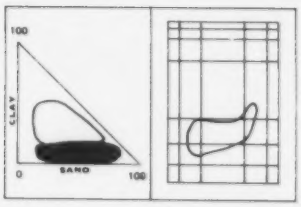
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sxw; Pl favoured on well-drained sites.
Acceptable	- Bl as minor component.
Logging:	- winter. - summer during dry periods. - risk of soil compaction on fine-textured soil.
Site preparation:	
Mechanical	- OK. - may increase brush competition. - good alternative for providing planter access on sites where burning is undesirable. - if scraping or scalping fine-textured soil horizons, plant on mounds rather than in the depressions or gouges.
Prescribed fire	- OK (AVOID ON COLLUVIAL LANDFORMS). - if no Ah horizon, maintain F and H layers. - if Ah horizon present, impacts of fire not so great a concern.
Brush hazard:	- moderate - high. - deciduous trees often present, try to control sprouting and suckering. - plan for one maintenance treatment; assess at time of planting.
Reforestation:	- plant Sxw, Pl.
Other comments:	- cable logging should be practiced on steeper slopes. - uneven-age management is an alternative. - fair potential for native range or tame pasture.

OAK FERN (SBSel/07)

SLOPE POSITIONS: Usually middle and lower slopes, but can also occur on upper slopes in moister parts of the subzone.

SLOPE RANGE: 2-60%.

ASPECT: All.



VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSel/07(a)	Fine textured phase SBSel/07(b)
TREE: stands often fairly open; all tree species grow well [50]. Sxw Bl Pl	TEXTURE: Coarse-loamy, loamy-skeletal.	Fine-loamy, clayey.
	DRAINAGE: Moderately good.	Imperfect.
SHRUB: moderately developed [54]. Bl Vaccinium membranaceum Rubus parviflorus Ribes lacustre Oplopanax horridus	EFFECTIVE ROOTING: A restrictive horizon (water or compacted till) is usually present between 30 and 80 cm.	Restrictive horizon between 45 and 80 cm.
HERB: moderately well developed [73]. Gymnocarpium dryopteris Cornus canadensis Rubus pedatus Tiarella trifoliata (Streptopus amplexifolius)	TERRAIN/PARENT MATERIALS: Morainal blankets; colluvial veneers over morainal blankets.	Morainal blankets.
MOSS: moderately well developed; cover often discontinuous [78]. Pleurozium schreberi Ptilium crista-castrensis Barbilophozia lycopodioides Mnium spp. Brachythecium spp.	SOIL NAME: Orthic Humo-Ferric Podzols; Orthic Dystric Brunisols.	Dark, Gleyed Brunisolic, and Brunisolic Gray Luvisols.
	HUMUS FORM: Hormoders; (Hemimors).	Hormoders; Lepto-moders; Hemimors.
	OTHER FEATURES:	Strong tendency towards Ah development.

COMMENTS: This ecosystem association occurs throughout the subzone but is relatively uncommon in the Lakes and southern Morice Timber Supply Areas.

OAK FERN (SBSel/07)

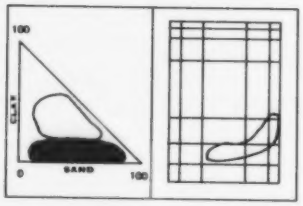
ACTIVITY OR CONCERN	Coarse textured phase SBSel/07(a)	Fine textured phase SBSel/07(b)
Species choice:		
Preferred	- Pl and/or Sxw.	- Sxw and/or Pl.
Acceptable	- Bl.	- Bl.
Logging:	- winter and during dry periods in summer. - summer logging may increase brush competition. - during summer try a wide-tracked cat or FMC.	
Site preparation:		
Mechanical	- OK. - may increase brush competition. - good alternative to burning for providing planter access.	- if scraping or scalping sites with fine-textured soil horizons, plant on the mounds rather than in the depression or gouges.
Prescribed fire	- OK; if no Ah horizon present, maintain F and H layers; otherwise impacts of fire are of lesser concern.	
Brush hazard:	- moderate; high if ecosystems severely disturbed.	
Reforestation:	- plant Pl, Sxw.	- plant Sxw, Pl.
	- plant sturdy vigorous stock; may have to screef.	
Other comments:	- uneven-age management is an option.	

DEVIL'S CLUB (SBSel/08)

SLOPE POSITIONS: Almost always on lower or toe slopes; slope bases; in gullies along streams.

SLOPE RANGE: 2-55%, usually less than 30%.

ASPECT: All.



VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSel/08(a)	Fine textured phase SBSel/08(b)
TREE: trees usually large but widely spaced [43]. Sxw Bl	TEXTURE: Coarse-loamy, loamy-skeletal, sandy-skeletal.	Fine-loamy, clayey.
SHRUB: well developed and vigorous, with both tall and low shrubs [73]. Bl (Sxw) Oplopanax horridus Rubus parviflorus Ribes lacustre	DRAINAGE: Rapid to good.	Moderately good to imperfect.
	EFFECTIVE ROOTING: Deep.	Restrictive layers at 20 - 80 cm.
	COARSE FRAGMENT CONTENT: Sometimes greater than 35%.	
HERB: moderately developed; patchy but diverse and vigorous [56]. Gymnocarpium dryopteris Cornus canadensis Rubus pedatus Streptopus amplexifolius (Gallium triflorum) (Tiarella trifoliata)	TERRAIN/PARENT MATERIALS: Fluvial fans; glacio-fluvial terraces.	Morainal blankets.
	SOIL NAME: Orthic Dystric and Eutric Brunisols.	Orthic, Gleyed Dark, Dark, and Brunisolic Gray Luvisols; Orthic Humic Podzols; Orthic Gleysols; Orthic Eutric Brunisols.
MOSS: poorly to moderately developed; patchy [47]. Mnium spp. Brachythecium spp. Pleurozium schreberi Pellia cristo-castrensis	HUMUS FORM: Hemimors; Humimors; Mormoders.	Hemimors; Humimors; Mormoders.
	OTHER FEATURES: Periodic seepage.	Periodic seepage.

COMMENTS: This ecosystem association occurs throughout the subzone; patchy in distribution over subdued plateau terrain, more widespread and better developed in mountainous regions.

DEVIL'S CLUB (SBSel/08)

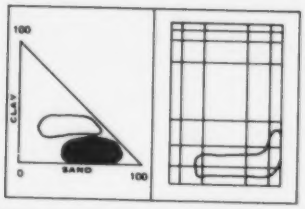
ACTIVITY OR CONCERN	Coarse textured phase SBSel/08(a)	Fine textured phase SBSel/08(b)
Species choice:		
Preferred	- Sxw and/or Pl.	- Sxw.
Acceptable	- Bl.	- Bl, Pl (although sites usually too wet).
Logging:	- winter or dry periods in summer.	- WINTER ONLY.
Site preparation:		
Mechanical	- patch scarify to create enough spots suitable for planting, with minimum soil exposure.	- create mounds; high water table may be present.
Prescribed fire	- OK, will temporarily reduce brush problem.	
Brush hazard:	- high. - plantation maintenance probably necessary to reduce brush.	- high.
Reforestation:	- plant Sxw or Pl. - plant sturdy vigorous stock; screefing may be necessary. - plant on edge of scarified patch.	- plant Sxw. - plant on mounds.

HORSETAIL FLAT (SBSel/09)

SLOPE POSITIONS: Toe slopes, depressions, and level valley bottoms.

SLOPE RANGE: 0-10%, usually flat.

ASPECT: Not applicable.



VEGETATION LAYERS	SOILS	
	Coarse textured phase SBSel/09(a)	Fine textured phase SBSel/09(b)
TREE: mature trees large but widely spaced [51]. Sxw Bl	TEXTURE: Coarse-loamy.	Fine-loamy.
	DRAINAGE: Moderately good to good.	Poor.
SHRUB: moderately developed with both tall and low shrubs [48]. Bl (Sxw) Lonicera involucrata Ribes lacustre Alnus incana	EFFECTIVE ROOTING: Deeper than in fine textured phase.	Shallow (20 cm).
	TERRAIN/PARENT MATERIALS: Fluvial blankets.	Morainal and lacustrine blankets.
	SOIL NAME: Orthic Dystric Brunisol; Cumulic Regosols.	Orthic, Orthic Humic, and Rego Gleysols.
HERB: well developed, vigorous [83]. Equisetum arvense E. sylvaticum E. pratense Rubus pubescens Gymnocarpium dryopteris Cornus canadensis Rubus pedatus Streptopus amplexifolius Mitella nuda	HUMUS FORM: Leptomoders; Mormoders; (Rhizomulls).	Hydromoders; Hydromors; (Histomoders).
	OTHER FEATURES: Organic horizons less than 10 cm thick.	Thick surface organic horizons; shallow water table.
MOSS: poorly to moderately developed; patchy [67]. Mnium spp. Pleurozium schreberi (Brachythecium spp.)		

COMMENTS: This ecosystem association is common throughout the subzone but rarely extensive; occurs in moisture - receiving positions in depressions and draws along streams, and around lakes and wetlands.

HORSETAIL FLAT (SBSel/09)

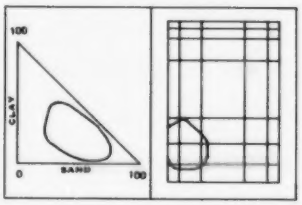
ACTIVITY OR CONCERN	Coarse textured phase SBSel/09(a)	Fine textured phase SBSel/09(b)
Species choice:		
Preferred	- Sxw.	- Sxw.
Acceptable	- Pl, (Bl).	- Bl, Pl (although usually too wet).
Logging:	- summer or winter. - AVOID USING SKIDDERS IN SUMMER to reduce excessive soil disturbance. - MSP required only if winter logged.	- winter only.
Site preparation:		
Mechanical	- OK. - will produce spots suitable for planting	- probably beneficial but not feasible due to high water table.
Prescribed fire	- not recommended. - maintain organic matter to protect the sites from erosion during flooding.	- beneficial but difficult due to wet conditions throughout the year.
Brush hazard:	- expect high to extreme brush competition, mainly shrubs and deciduous trees.	
Reforestation:	- PLANT Sxw IMMEDIATELY (tall, large caliper stock).	
Other comments:	- selection regeneration method is a practical option. - cottonwood acceptable on well-drained sites.	

MOIST POOR SPRUCE - FEATHER MOSS
(SBSe1/10)

SLOPE POSITIONS: Lower and toe slopes; level and depressional.

SLOPE RANGE: 0-15%.

ASPECT: Not applicable.



VEGETATION LAYERS	SOILS
TREE: stands moderately to fully stocked; fair to poor growth. Sxw Bl Pl (Sb) SHRUB: usually well developed; often abundant regeneration. Bl Alnus incana (Sb) (Spiraea douglasii) (Lonicera involucrata) (Salix spp.) (Ribes lacustre) (Ledum groenlandicum) HERB: moderately developed; diverse. Cornus canadensis Linnaea borealis Lycopodium annotinum Rubus pedatus Calamagrostis canadensis Mitella nuda Sanguisorba canadensis (Equisetum arvense) (Vaccinium caespitosum) MOSS: well developed. Mnium spp. Ptilium crista-castrensis Aulacomnium palustre (Drepanocladus spp.)	DRAINAGE: Imperfect to poor due to perched water table. TERRAIN/PARENT MATERIALS: Glaciofluvial, morainal, and lacustrine blankets; some lacustrine veneers. SOIL NAME: Gleyed Gray Luvisols; Rego and Humic Gleysols. HUMUS FORM: Hemimors; Hydromors; Hydromoders. OTHER FEATURES: Commonly gravelly, stony soils; relatively thick humus layers.

COMMENTS: Scattered distribution; most common on Nechako Plateau; often as a narrow band around wetlands or on imperfectly drained glaciofluvial terrain.

MOIST POOR SPRUCE - FEATHER MOSS (SBSe1/10)

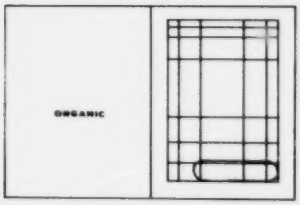
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- Sxw.
Unacceptable	- Bl and Sb.
Logging:	- winter. - summer during dry periods.
Site preparation:	
Mechanical	- OK. - preferable during summer dry periods to avoid soil compaction.
Prescribed fire	- OK.
Brush hazard:	- not expected.
Reforestation:	- plant Pl. - plant Sxw on mounds; if at all. - expect some natural regeneration of Pl and Sxw.

FEN AND SWAMP ECOSYSTEMS (SBSel/11)

SLOPE POSITIONS: Level and depressional.

SLOPE RANGE: 0 (level).

ASPECT: Not applicable.



VEGETATION LAYERS	SOILS
TREE: sparse to poorly developed; trees tend to be clumped [15]. Sb Sxw	DRAINAGE: Very poor.
SHRUB: moderately to well developed [50]. Sb Salix barclayi S. glauca S. drummondiana Betula glandulosa	TERRAIN/PARENT MATERIALS: Organic blankets.
HERB: moderately well developed, diverse; dominated by sedges [59]. Carex aquatilis C. disperma Calamagrostis canadensis	SOIL NAME: Fibrisols and Mesisols.
MOSS: well developed [80]. Sphagnum spp. Tomenthypnum nitens Aulacomnium palustre	HUMUS FORM: Histomors.
	OTHER FEATURES: The upper horizons (Of) show very little decomposition.

COMMENTS: THESE ECOSYSTEMS ARE NOT SUITABLE FOR TIMBER PRODUCTION.

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APPENDIX 1. Tree species symbols

Latin name	Common name	Symbol
Abies amabilis	amabilis fir	Ba
Abies lasiocarpa	subalpine fir	Bl
Alnus rubra	red alder	Dr
Betula papyrifera	paper birch	Ep
Picea engelmannii x *sitchensis*	-	Sxe
Picea glauca x *engelmannii*	hybrid white spruce	Sxw
Picea glauca x *sitchensis*	Roche spruce	Sxs
Picea mariana	black spruce	Sb
Pinus contorta var. *latifolia*	lodgepole pine	Pl
Populus balsamifera ssp. *trichocarpa*	black cottonwood	Act
Populus tremuloides	trembling aspen	At
Pseudotsuga menziesii var. *glauca*	Douglas-fir	Fd
Thuja plicata	western redcedar	Cw
Tsuga heterophylla	western hemlock	Hw
Tsuga mertensiana	mountain hemlock	Hm

APPENDIX 2. List of plant names used in the guide

TREES:

Abies lasiocarpa	subalpine fir
Juniperus scopulorum	Rocky mountain juniper
Picea glauca x engelmannii	hybrid white spruce
Picea mariana	black spruce
Pinus contorta	lodgepole pine
Populus balsamifera ssp. trichocarpa	black cottonwood
Populus tremuloides	trembling aspen
Pseudotsuga menziesii var. glauca	Douglas-fir

SHRUBS:

Alnus incana ssp. tenuifolia	mountain alder
Alnus viridis ssp. sinuata	Sitka alder
Amelanchier alnifolia	Saskatoon
Betula glandulosa	scrub birch
Cornus sericea	red-osier dogwood
Corylus cornuta	hazelnut
Juniperus communis	common juniper
Ledum groenlandicum	Labrador tea
Lonicera involucrata	black twinberry
Oplopanax horridus	devil's club
Prunus virginiana	choke cherry
Ribes hudsonianum	northern black currant
Ribes lacustre	black gooseberry
Rosa acicularis	prickly rose
Rosa nutkana	Nootka rose
Rubus parviflorus	thimbleberry
Rubus spectabilis	salmonberry
Salix barclayi	Barclay's willow
Salix drummondiana	Drummond's willow
Salix glauca	grey-leaved willow
Salix spp.	willows
Shepherdia canadensis	soopolallie
Spiraea betulifolia	birch-leaved spiraea
Spiraea douglasii	hardhack
Symphoricarpos albus	common snowberry
Vaccinium alaskaense	Alaskan blueberry
Vaccinium membranaceum	black huckleberry
Vaccinium ovalifolium	oval-leaved blueberry
Vaccinium parvifolium	red huckleberry
Viburnum edule	highbush-cranberry

HERBS AND DWARF SHRUBS:

Agropyron trachycaulum	slender wheatgrass
Arctostaphylos uva-ursi	kinnikinnick
Arnica cordifolia	heart-leaved arnica
Artemisia arctica	mountain sage
Aster conspicuus	showy aster
Athyrium filix-femina	lady fern
Bromus spp.	bromegrasses
Calamagrostis canadensis	bluejoint
Calamagrostis spp.	reedgrasses
Carex aquatilis	water sedge
Carex disperma	soft-leaved sedge
Carex spp.	sedges
Cassiope mertensiana	white mountain-heather
Chimaphila umbellata	prince's pine
Cornus canadensis	bunchberry
Dryopteris assimilis	spiny wood fern
Elymus glaucus	blue wildrye
Empetrum nigrum	crowberry
Epilobium angustifolium	fireweed
Equisetum arvense	common horsetail
Equisetum fluviatile	swamp horsetail
Equisetum pratense	meadow horsetail
Equisetum spp.	horsetails
Equisetum sylvaticum	wood horsetail
Fragaria virginiana	wild strawberry
Galium boreale	northern bedstraw
Galium triflorum	creeping sweet bedstraw
Gaultheria hispidula	creeping-snowberry
Gymnocarpium dryopteris	oak fern
Kalmia microphylla	bog-laurel
Koeleria macrantha	junegrass
Lathyrus nevadensis	purple peavine
Lathyrus ochroleucus	creamy peavine
Linnaea borealis	twinflower
Lycopodium annotinum	stiff club-moss
Lysichiton americanum	skunk cabbage
Mitella nuda	common mitrewort
Oryzopsis spp.	ricegrasses
Osmorhiza chilensis	mountain sweet-cicely
Petasites palmatus	palmate colt's-foot
Phleum pratense	timothy
Phyllodoce empetriformis	pink mountain-heather
Poa gracillima	Pacific bluegrass
Poa interior	inland bluegrass
Poa pratensis	Kentucky bluegrass
Potentilla palustris	marsh cinquefoil
Rubus chamaemorus	cloudberry
Rubus pedatus	five-leaved bramble
Rubus pubescens	trailing raspberry
Sanguisorba canadensis	Sitka burnet

Schizachne purpurascens	false melic
Senecio triangularis	arrowleaved groundsel
Smilacina racemosa	false Solomon's-seal
Stipa richardsonii	spreading needlegrass
Streptopus amplexifolius	clasping twistedstalk
Streptopus roseus	rosy twistedstalk
Taraxacum officinale	dandelion
Thalictrum occidentale	western meadowrue
Tiarella spp.	foamflowers
Tiarella trifoliata	three-leaved foamflower
Vaccinium caespitosum	dwarf blueberry
Vaccinium oxycoccos	bog cranberry
Valeriana sitchensis	Sitka valerian
Veratrum viride	Indian hellebore
Vicia americana	American vetch

LICHENS, MOSSES, AND LIVERWORTS:

Aulacomnium palustre	glow moss
Barbilophozia lycopodioides	
Barbilophozia spp.	liverwort
Brachythecium spp.	moss
Calliergon spp.	moss
Cladina spp.	lichen
Cladonia spp.	lichen
Dicranum fuscescens	
Dicranum polysetum	
Dicranum spp.	moss
Drepanocladus spp.	moss
Hylocomium splendens	step moss
Icmadophila ericetorum	lichen
Mnium spp.	leafy mosses
Peltigera spp.	lichen
Pleurozium schreberi	red-stemmed feathermoss
Polytrichum juniperinum	
Polytrichum spp.	haircap mosses
Ptilium crista-castrensis	knight's plume feathermoss
Rhytidiadelphus loreus	little shaggy moss
Rhytidiadelphus triquetrus	electrified cat's-tail moss
Rhytidiopsis robusta	pipecleaner moss
Sphagnum capillaceum	common red sphagnum
Sphagnum spp.	peat mosses (sphagnum)
Stereocaulon tomentosum	lichen
Timmia austriaca	moss
Tomenthypnum nitens	moss
Tortula ruralis	moss

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